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Book review

**Editor-in-Chief – Direttore scientifico:** Paolo G. Albano (pgalbano@gmail.com)

TABLES

Tables should be composed as text files, exactly at printing size (see under Illustrations), using a *sans-serif* font not smaller than 8-9 pts. Avoid thick borders and heavy grids. They are referred to in the text as Tab. (e.g. **Tab. 2**, **Tabs 3-6**, not Tabs.). Abbreviations are explained in the captions or under Material and methods. Tables are kept as separate files, not embedded in the text.

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Family Cardiidae Lamarck, 1809  
Subfamily Cardinae Lamarck, 1809  
Genus *Acanthocardia* Gray, 1853  
(type species *Cardium aculeatum* Linné, 1758)

*Cardium indicum* Lamarck, 1819  
(Fig. 1. A-D, Fig. 2. C)

*Cardium hians* Brocchi, 1814: p. 508, tav. 13, fig. 6 (non Spengler, 1799).  
*Cardium indicum* Lamarck, 1819: p. 4.  
*Cardium (Cardium) indicum* Lamarck – Fischer-Piette, 1977: p. 112, tav. 10, fig. 4 (tipo).

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... riportato da Richardson & Smith (1965)  
... come noto in letteratura (Ross et al., 1993; Rosenberg, 1995, 1997; Michelini & Andriani, 2000)  
... l'illustrazione originale (Torwald, 1879: p. 56, tav. 2, fig. 5).

Esempi di bibliografia:  
SALAS C., 1996. Marine Bivalves from off the Southern Iberian Peninsula collected by the Balgim and Fauna 1 expeditions. *Haliotis*, **25**: 33-100.  
GRILL B. & ZUSCHIN M., 2001. Modern shallow- to deep-water bivalve death assemblages in the Red Sea – ecology and biogeography. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **168**: 75-96.  
BOSS K.J., 1982. Mollusca, in Parker S.P. (ed.), *Synopsis and Classification of Living Organisms*. Vol. 1. McGraw-Hill, New York: 945-1166.  
CARTER J.G., CAMPBELL D.C. & CAMPBELL M.R. 2000. Cladistic perspectives on early bivalve evolution, in Harper E.M., Taylor J.D. & Crame J.A. (eds), *The Evolutionary Biology of the Bivalvia*. *Geological Society, London, Special Publications*, **177**: 47-95.  
VOKES H.E., 1980. *Genera of the Bivalvia: a systematic and bibliographic catalogue (revised and update)*. Paleontological Research Institution, Ithaca, Edwards Brothers Inc., 307 pp.

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## Book review

MICHEL BOUTET, ROBERT GOURGUET & JEAN LETOURNEUX avec la collaboration de NABILA GAERTNER-MAZOUNI, 2020. *Mollusques Marins de Polynésie française [Marine Molluscs of French Polynesia]*. Tahiti, Éditions au vent des îles, 766 pp.

Low cost printing, easy access to new and ancient papers or books, great improvement of optical tools in both traditional and smartphone cameras, easy to use software for photo processing are all contributing to the great improvement in the publishing of the recent years on shells and molluscs. Monographic papers on a group of species, a genus or also a family are usually published in scientific journals or bulletins, while books are usually devoted to illustrate faunas of a more or less large area. These kinds of books are much appreciated by collectors and are also very useful to biogeographers because they provide a list of species, often supported by photos, to compare faunas.

This book on the Marine Molluscs of French Polynesia is very interesting in covering a malacofauna not so far well investigated: only two illustrated books on Polynesian shells were published in the past, the most complete was by Salvat and Rives (1975) illustrating 472 species. Some more recent inventories listed 2373 and 2053 species (Tröndlé & Boutet, 2009 and Salvat & Tröndlé, 2017, respectively).

The French Polynesian malacofauna inhabits true oceanic islands far from any continental mass and represents the southern counterpart of the Hawaiian one which was already well studied by Kay (1979) and more recently by Severns (2011). Now biogeographers have a good tool to compare these faunas finding similarities and differences and possibly to understand patterns of colonization.

The authors recorded 3022 species (about twice the ones recorded from the Hawaiian Islands) and 2541 of them are illustrated. There is some discrepancy between the number of the species not illustrated which should be 481, but on page 11 we read a total of 645 species mentioned. They are mostly undetermined and are listed at the end of the volume (and my count was 472 by my fault).

The reliability of the correct identification is due not only to the deep malacological knowledge of the authors, but also to the great number of specialists involved in checking the identifications of the species they are concerned: 74 are acknowledged and 22 are given special thanks.

In the first part of the book there are the following introductory items written by several scientific contributors: "From Bougainville to DNA sequencing. 250 years of malacological exploration in French Polynesia." by Philippe Bouchet, "Conservation of Molluscs diversity in French Polynesia: a broad range of issues." by Nabila Gaertner-Mazouni and Jean-Claude Gaertner, and "A brief geological story of French Polynesia Bernard Salvat: Geomorphology of the Polynesian Islands." by Bertrand Martin-Garin & Lucien Montaggioni. One of the authors, Jean Letourneux, wrote "The place of shells in the daily life of the inhabitants of the archipelagos of French Polynesia before the arrival of Europeans" and, in collaboration, with Nabila Gaertner-Mazouni "Molluscs: Natural and opportunities for the development of a blue economy".

The systematic part gives some information on the biology of the treated group, such as a families or genera, and illustrates the species found usually with more than one photo showing

the same shell from different views or the range of variability of the species. The size, the distribution, the depth range, and photo credits are also indicated.

Photographs are of good quality in general without dominating colours, and some small species are illustrated by scanning electron microscopy.

The book is well done, is interesting and last but not least the price is affordable: 99 euros, but, in my opinion, two points of criticism should be addressed as in the case of other similar books like the ones of Severns (2011) or Okutani (2000). First, there is a rather complete absence of synonymy, even for the most common species. Second, there is a complete absence of identification tools. For example, Triphoridae or Cerithiopsidae have characteristic protoconchs distinguishing species. A good digital photo (SEM will be better, but difficult to obtain to amateur conchologists) of the apex of the shell would help in identifying the specimen. A detailed description of the shell would not be necessary, but the description of the key diagnostic characters would have been useful. A further paradigmatic case, in my opinion, is the family Triviidae: a lot of species were recently described by Fehse on the basis of subtle characters which might have been indicated.

Due to the practical improvements mentioned at the beginning of this review, malacological books shifted in time from long tedious descriptions and bad figures to a complete absence of descriptions replaced by very good figures. These kind of books are not simply beautiful photographic books, they are tools giving to malacologists means of knowledge which were not satisfied by the examination of one or more generic figures. On the opposite side, there are wonderful books like those of Beesley et al (1998) which are very detailed from the biological point of view but do not list any species, despite the word "fauna" in the title. I hope for the future that a more balanced approach will be found and the old book of Kay (1979) might represent a good example.

BRUNO SABELLI

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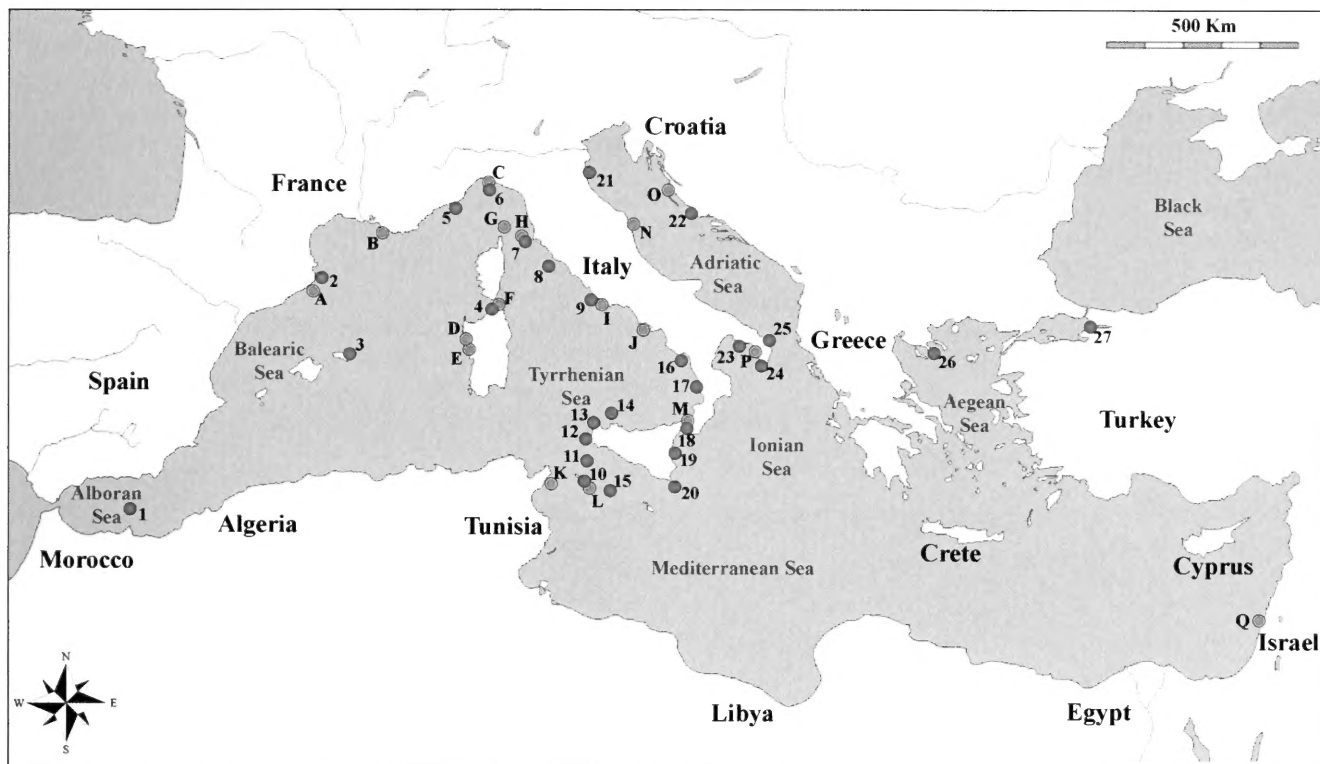
- 1981 *Hanleya hanleyi* – Poulicek & Poppe, p. 536 (“Calvi”, Corsica).
- 1983 *Hanleya hanleya* (sic) – Kisseleva, p. 116 (“Stock Bank”, Aegean Sea).
- 1985 *Hanleya hanleyi* – Panetta et al., p. 767 (“Banco dell’Amendolara”).
- 1985 *Hanleya hanleyi* – Orlando & Palazzi, p. 37 (“Golfo di Castellamare”).
- 1985 *Hanleya hanleyi* – Della Bella & Dell’Angelo, p. 310 (“Le Formiche di Grosseto”).
- 1989 *Hanleya hanleyi* – Cecalupo & Giusti, p. 99 (“Capraia Island”).
- 1990 *Hanleya hanleyi* – Mifsud et al., p. 54, fig. (“Blata Steps”, Malta).
- 1990 *Hanleya hanleyi* – Strack, p. 15 (“N. Diaphoros”, Greece).
- 1993 *Hanleya hanleyi* – Giovine & Dell’Angelo, p. 160 (“Villa S. Giovanni”).
- 1994 *Hanleya hanleyi* – Panetta & Imperatrice, p. 38 (“Banco dell’Amendolara”).
- 1996 *Hanleya hanleyi* – Biondi & Di Paco, p. 19 (“area between Gorgona Island and S. Lucia Bank”, -300/500m).
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- 2011 *Hanleya hanleyi* – Albano, Annex 1 (“Secche di Tor Paterno”).
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**Fig. 6.** Known records of *Hanleya hanleyi* (yellow circles) and *H. mediterranea* (red circles). *Hanleya hanleyi*: A: Barcelona, St. Pol (Slieker, 2000); B: Marsiglia, Port Cros National Park (this study); C: Genova Boccadasse (this study); D: Alghero (this study); E: Bosa (this study); F: Bocche di Bonifacio, Bonifacio (Dell'Angelo & Smriglio, 1999; this study); G: between Capo Corso and Capraia Island (Dell'Angelo & Giusti, 1997); H: Tuscan Archipelago, Capraia Isl., Pianosa Isl., Le Formiche di Grosseto (Sabelli, 1972, 1974; Dell'Angelo & Smriglio, 1999; Cossignani & Ardovini, 2011; Scaperrotta et al., 2015; this study); I: Anzio (Cossignani & Ardovini 2011); J: Napoli, Bocca Piccola (Malatesta, 1962); K: Tunisia, Korba Bank (Sabelli, 1972); L: Fossa di Pantelleria, Sicily Channell (Sabelli, 1972; Dell'Angelo et al., 1998); M: Scilla cave (this study); N: Civitanova Marche (Dell'Angelo & Smriglio, 1999); O: Croatia, Punte Bianche (Monterosato, 1880; Gaglini, 1985); P: Porto Cesareo (this study); Q: Israel, Haifa (Albano et al., 2020; this study). *Hanleya mediterranea*: 1: Alboran Isl. (this study); 2: Begur (Sirenko, 2014); 3: Minorca Isl. (this study); 4: Bonifacio (this study); 5: Imperia (this study); 6: Genova Boccadasse (Dell'Angelo & Smriglio, 1999; this study); 7: Tuscan Archipelago, Elba Isl., Giglio Isl., Gorgona Isl., Montecristo Isl., Pianosa Isl., Capraia Isl., Le Formiche di Grosseto (Scaperrotta et al., 2015; this study); 8: Argentario (this study); 9: Tor Paterno (this study); 10: Pantelleria Isl. (this study); 11: Adventure Bank (this study); 12: Favignana Isl., Marettimo Isl. (Dell'Angelo et al., 1998; Dell'Angelo & Smriglio, 1999); 13: Scuso Bank (Dell'Angelo et al., 1998; Dell'Angelo & Smriglio, 1999); 14: Ustica Isl. (this study); 15: Sicily Channell (this study); 16: Porto degli Infreschi (this study); 17: Cetraro (this study); 18: Ganzirri, Scilla, Messina Strait, Lazzaro (this study); 19: Acitrezza, Cannizzaro, Ognina, Catania (this study); 20: Porto Palo (this study); 21: Porto Garibaldi (this study); 22: Prvkic Isl. (this study); 23: Torre Zozzoli (this study); 24: Torre S. Giovanni (this study); 25: Lecce (this study); 26: Ormos Panagias (this study); 27: Prinkipo (Sirenko, 2014).

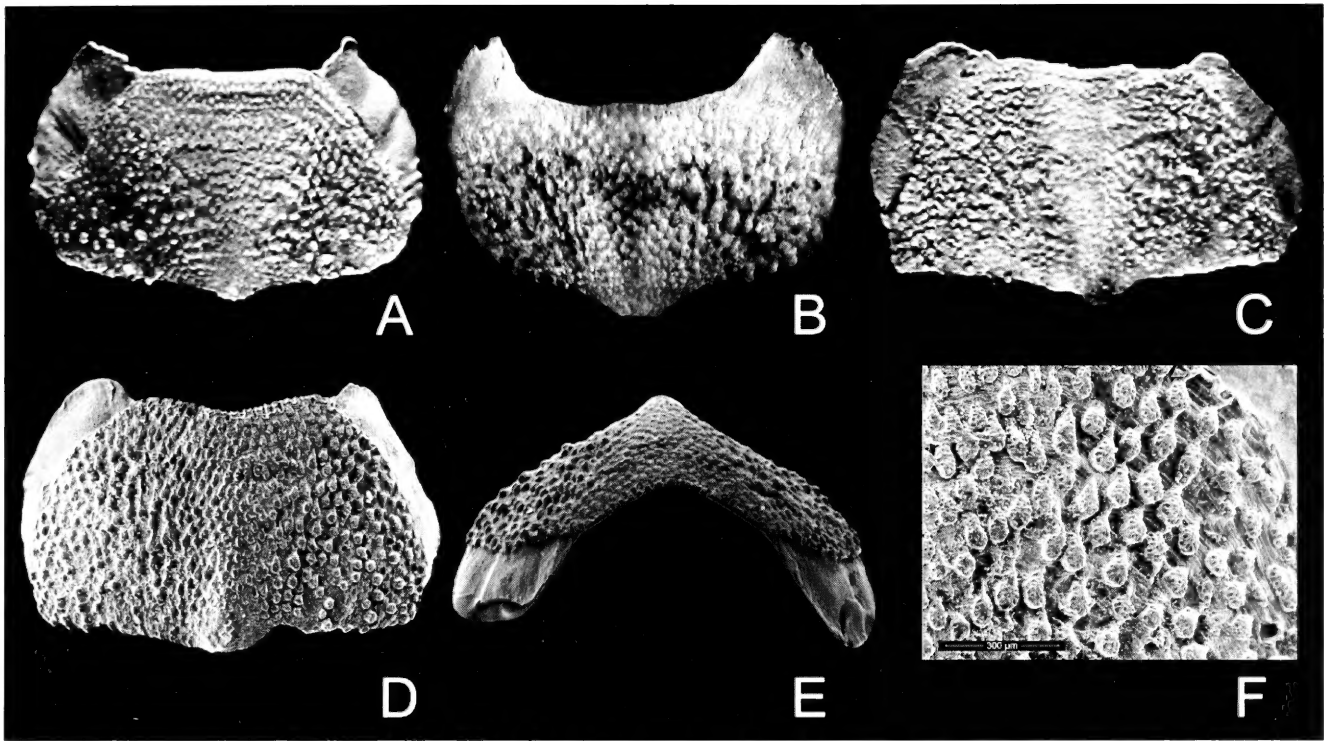
the Italian coasts. Many records refer to the Tuscan Archipelago (Formiche di Grosseto, islands of Elba, Giglio, Gorgona, Montecristo and Pianosa), the Strait of Messina (Ganzirri, Scilla, and Lazzaro), and along the western Sicilian coasts (Scuso Bank, Favignana and Marettimo islands). There are a few records in the western (Alboran island, Bagur and Minorca island) and eastern Mediterranean (only at Ormos Panagias and Prinkipo), indicating that *H. mediterranea* is probably even more frequent than *H. hanleyi* in the Mediterranean basin. The two taxa co-occur in some localities, Genova Boccadasse, and Tuscan Archipelago (Capraia Island, Pianosa Island, and Le Formiche di Grosseto). Both species occurred syntopically also in the upper Miocene of Borelli, in Piedmont (Dell'Angelo et al., 2015). Our critical revision of published records and original material expands the geographical distribution of known species of *Hanleya* living in the Mediterranean basin (Fig. 6). It clearly appears that the recently described *H. mediterranea* is considerably more widespread in this basin than *H. hanleyi*.

*Hanleya* sp. indet.

All literature records of *Hanleya* in the Mediterranean Sea have been verified. Whenever specimens are figured, we have attributed the species either to *Hanleya hanleyi* or *H. mediterranea*. These records appear in the discussion of both taxa, together with their geographic data.

However, most such reports do not provide figures that permit a confident assessment of whether the considered taxon is either *H. hanleyi* or *H. mediterranea*. We prudentially consider these unfigured records of Mediterranean *Hanleya* in open nomenclature:

- 1859 *Chiton Hanleyi* – Capellini, p. 328 (“Sestri Levante?”).
- 1878 *Acanthopleura hanleyi* – Monterosato, p. 78 (“Livorno”).
- 1879 *Acanthopleura hanleyi* – Monterosato, p. 27 (“Palermo”, “Sciaccia”, “Livorno”).
- 1929 *Acanthopleura hanleyi* – Bellini, p. 60 (“Golfo di Napoli?”).
- 1938 *Hanleya hanleyi* – Leloup & Volz, p. 11, fig. 11 (“Punte Bianche”).
- 1967 *Hanleya hanleyi* – Liuzzi, p. 67 (“Canale di S. Pietro”, Sardinia).
- 1972 *Hanleya hanleyi* – Sabelli, p. 97 (“Secca di Tor Paterno”).
- 1978 *Hanleya hanleyi* – Altimira, p. 29 (“Sant Pol de Mar”, Barcelona).
- 1980 *Hanleya hanleyi* – Hallgass & Palisano, p. 35 (“Golfo di Palermo”).



**Fig. 5. A-F.** *Hanleya* aff. *mediterranea* Sirenko, 2014 **A.** Giglio Island, Tuscan Archipelago, intermediate valve, width 3.7 mm, dorsal view. **B.** Capraia Island, Tuscan Archipelago, intermediate valve, width 2.4 mm, dorsal view. **C.** Tipaza (Algeria), intermediate valve, width 3.5 mm, dorsal view. **D-F.** Capraia Island, Tuscan Archipelago, ZISP 2424, intermediate valve, width 3 mm, dorsal (D) and frontal (E) views, and close-up of surface ornamentation of pleural area (F).

**Fig. 5. A-F.** *Hanleya* aff. *mediterranea* Sirenko, 2014 **A.** Isola del Giglio, Arcipelago toscano, piastra intermedia, larghezza 3.7 mm, vista dorsale. **B.** Isola di Capraia, Arcipelago toscano, piastra intermedia, larghezza 2.4 mm, vista dorsale. **C.** Tipaza (Algeria), piastra intermedia, larghezza 3.5 mm, vista dorsale. **D-F.** Isola di Capraia, Arcipelago toscano, ZISP 2424, piastra intermedia, larghezza 3 mm, viste dorsale (D) e frontale (E) e dettaglio dell'ornamentazione dell'area pleurale (F).

**A**), Capraia Island (**Fig. 5. B, D-F**) and Tipaza, Algeria (**Fig. 5. C**). The granules in the pleural areas (**Fig. 5. F**) are oval, ca 75-110 x 50-60  $\mu$ m, smaller than those of *H. mediterranea* in the same area (120-220 x 70-160  $\mu$ m), with a similar structure (one megalaesthete surrounded by up to 12 micraesthetes). These intermediate valves show some similarities with two fossil species, *Hanleya glimmerodensis* Janssen, 1978 from the Oligocene of France and Germany, and *H. multigranosa* (Reuss, 1860) from the Miocene of the Paratethys. Both these species are scarcely known, have a sculpture of granules more or less arranged in longitudinal series in pleural areas, smaller and more irregular in jugal area. The valves here discussed undoubtedly show more affinity with *Hanleya mediterranea*, characterized by the lack of longitudinal rows of granules across the entire central area, while the other *Hanleya* species (*H. hanleyi* and the fossil species mentioned above) always show the granules ar-

ranged in longitudinal rows. For these reasons, and because of the scant material studied, we prefer at present to indicate them as *Hanleya* aff. *mediterranea*, and not insert them in the geographic distribution map of *H. mediterranea* (**Fig. 6**).

*Hanleya mediterranea* has been found at depths from 23 to 300 m, more frequently between 50 and 100 m (**Table 2**).

### Distribution

Mediterranean Sea, more frequent in the western and central parts, few reports in the Aegean Sea, not known in the Levantine region.

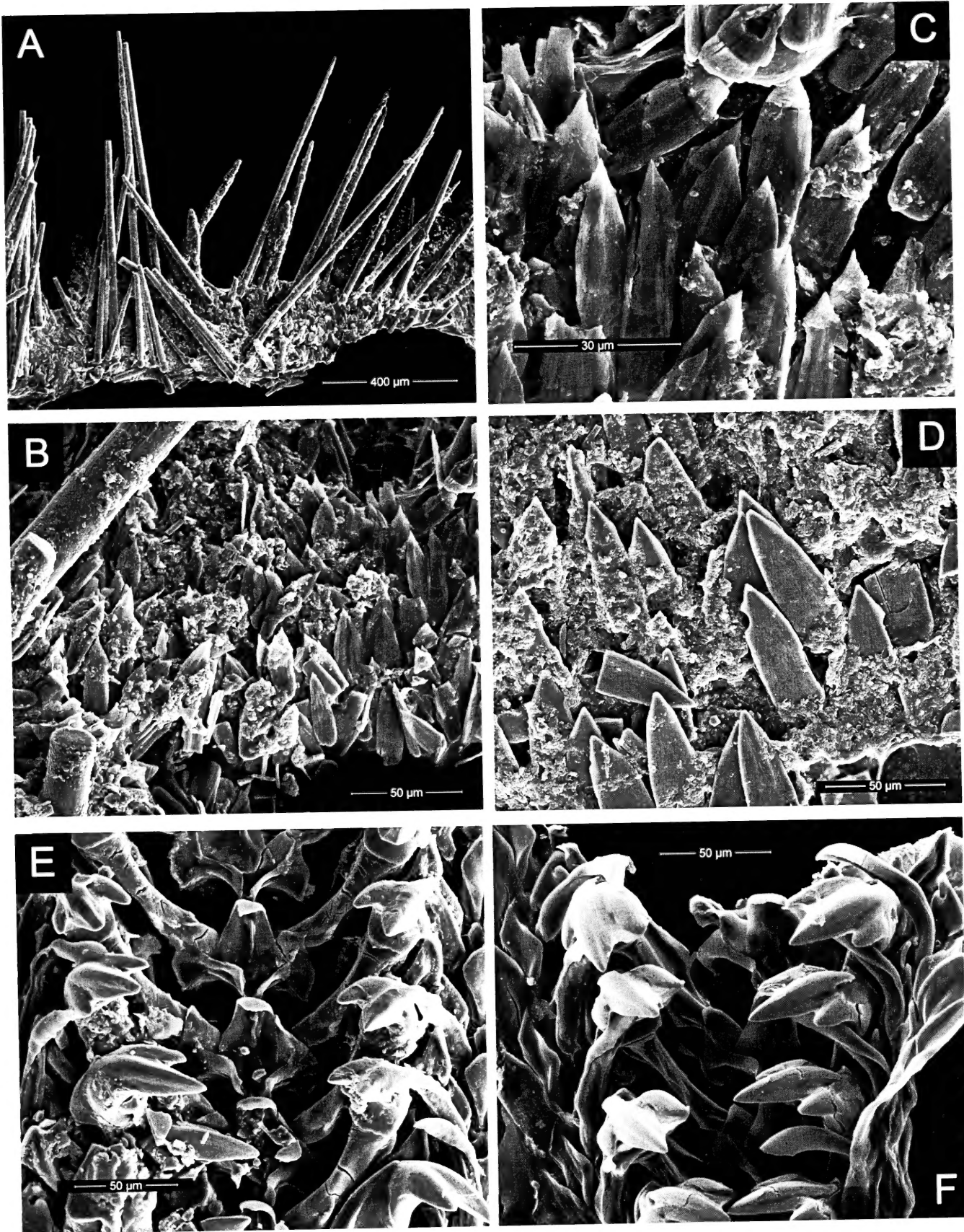
### Discussion

This study shows that *H. mediterranea* occurs all along

Country	sampling site	valves	width (mm)	depth (m)	repository	figs	references
Italy	Capraia Island	1 valve (II)	W 2.4	60-80	BD	5.B	this study
Italy	Capraia Island	1 valve (II)	W 3	60-80	ZISP 2424	5.D-F	this study
Italy	Giglio Island	1 valve (II)	W 3.7	40-50	BD	5.A	this study
Algeria	Tipaza	1 valve (II)	W 3.5		BD	5.C	this study

**Table 3.** *Hanleya* aff. *mediterranea*: summary of the material examined. Size measurements refer to width (W) for single valves (I = intermediate).

**Tab. 3.** *Hanleya* aff. *mediterranea*: riepilogo del materiale esaminato. Le misure si riferiscono alla larghezza (W) per le piastre singole (I = intermedia).



**Fig. 4. A-F.** *Hanleya mediterranea* Sirenko, 2014, ZISP 2422, specimen disarticulated for SEM analysis (Fig. 2. A, B). **A.** Dorsal marginal needles. **B.** Dorsal scales and needles. **C.** Dorsal scales. **D.** Ventral scales. **E-F.** Radula.

**Fig. 4. A-F.** *Hanleya mediterranea* Sirenko, 2014, ZISP 2422, esemplare disarticolato per l'analisi al SEM (Fig. 2. A, B). **A.** Spine marginali dorsali. **B.** Scaglie e spine dorsali. **C.** Scaglie dorsali. **D.** Scaglie ventrali. **E-F.** Radula.

ents and radula agree with those of the holotype (Sirenko, 2014: figs 6-7). Some of the intermediate valves examined show some slight differences from the other valves of *Hanleya me-*

*diterranea*, the granules are smaller, denser, and the large granules typical of *H. mediterranea* are less frequent and are not present in the jugal area. We illustrate these intermediate valves (**Tab. 3**), from Giglio Island (**Fig. 5.**



13	Italy	Scuso Bank	1 valve (1P)	W 1.5	113	BD		Dell'Angelo et al. 1998: pl. 2 fig. 2; Dell'Angelo & Smriglio 1999: pl. 25 figs E, H (as <i>H. hanleyi</i> )
14	Italy	Ustica Island	2 valves (2I)	W 2.3 max		BD		this study
15	Italy	Sicily Channell	2 valves (1A,1P)	W 2		DS		this study
16	Italy	Porto degli Infreschi	2 valves (2I)	W 2.5	36-50	BD	2.E	this study
17	Italy	Cetraro (Cosenza)	3 spm (1 disarticulated)	BL 5.5 max	60-80	WR		this study
17	Italy	Cetraro (Cosenza)	1 spm (disarticulated)	BL 3.5	60-80	ZISP 2422	2.A-B, 3.A-H, 4.A-F	this study
17	Italy	Cetraro (Cosenza)	3 spm	BL 7, 6, 4.5	60-80	FR		this study
18	Italy	Ganzirri	1 spm	BL 7.5		DS		this study
18	Italy	Scilla	2 valves (2I)	W 3.8 max	41	BD		this study
18	Italy	Scilla	1 valve (1P)	W 2.7	41	ZISP 2423	2.G-I	this study
18	Italy	Messina Strait	2 spm	BD 3, 6		BEL149Sd Meco 2021. H.m.1-2		this study
18	Italy	Lazzaro	2 valves (2A)	W 2	70	AV		this study
19	Italy	Acitrezza	1 valve (1I)	W 2.2		DS		this study
19	Italy	Cannizzaro	3 valves (3I)	W 2.3 max	40	BD		this study
19	Italy	Ognina	1 spm	BL 4.8		DS		this study
19	Italy	Catania	3 spm		50-60	FA		this study
20	Italy	Porto Palo	1 valve (1I)	W 2	28	BD		this study
21	Italy	Porto Garibaldi	1 valve (1I)	W 2	45	BD		this study
22	Croatia	Prvkic Island	1 valve (1I)	W 2.3	40	SB		this study
23	Italy	Torre Zozzoli	2 valves (2I)	W 2	80	BD		this study
24	Italy	Torre S. Giovanni	1 valve (1I)	W 2.5	75	BD		this study
25	Italy	Lecce	2 valves (2I)	W 1.6		BD		this study
26	Greece	Ormos Panagias	1 valve (1I)	W 2.5	33	BD		this study
27	Turkey	Prinkipo	3 spm	BL 4, 4.7	50	ZISP 2202		Sirenko 2014, Paratypes: figs 8A-J

**Table 2.** *Hanleya mediterranea*: summary of the material examined. Size measurements refer to body length (BL) for complete specimens and width (W) for single valves (A = anterior, I = intermediate, P = posterior).

**Tab. 2.** *Hanleya mediterranea*: riepilogo del materiale esaminato. Le misure si riferiscono alla lunghezza dell'esemplare (BL) per gli individui completi ed alla larghezza (W) per le piastre singole (A = anteriore, I = intermedia, P = posteriore).

2015 *Hanleya hanleyi* – Scaperrotta et al., p. 35 (*partim*, “Capraia Island”).

Type material

Holotype, ZISP 2201, BL = 4.7 mm, disarticulated, consisting of mounts of shell, perinotum and radula, and three paratypes, ZISP 2202, BL = 4.0-4.7 mm, off Prinkipo, Turkey.

Type locality

Mediterranean Sea, off Begur, Girona, Spain, 200-300 m.

Material examined

An overview of all the material examined, both complete specimens and single valves, is provided in **Tab. 2**.

Remarks

*Hanleya mediterranea* is characterized by the tegmentum sculptured with roundish/oval granules arranged without pattern; some are joined forming larger granules in pleural areas (from 120 × 70 µm up to 220 × 160 µm), jugal area sculptured with oval granules (about 80 × 50 µm) arranged without interspaces or pattern. Each granule contains one megalaesthete surrounded by 9-16 micraesthetes. This species is distinguished from other congeners by the lack of longitudinal rows of granules across the entire pleural area, and by the presence of large granules comprising two or more small granules (Sirenko, 2014).

Given the rarity of the known reports of *Hanleya mediterranea*, a specimen from Cetraro has been studied by SEM (figs 3-4), and the features of valves, girdle elem-

Distribution

Atlantic Ocean, from 25° S (Brazil) to 74° N (Greenland), including the Mediterranean Sea, and the Gulf of Mexico (Sirenko et al. 2016; this study).

*Hanleya mediterranea* Sirenko, 2014  
(Figs. 2-5)

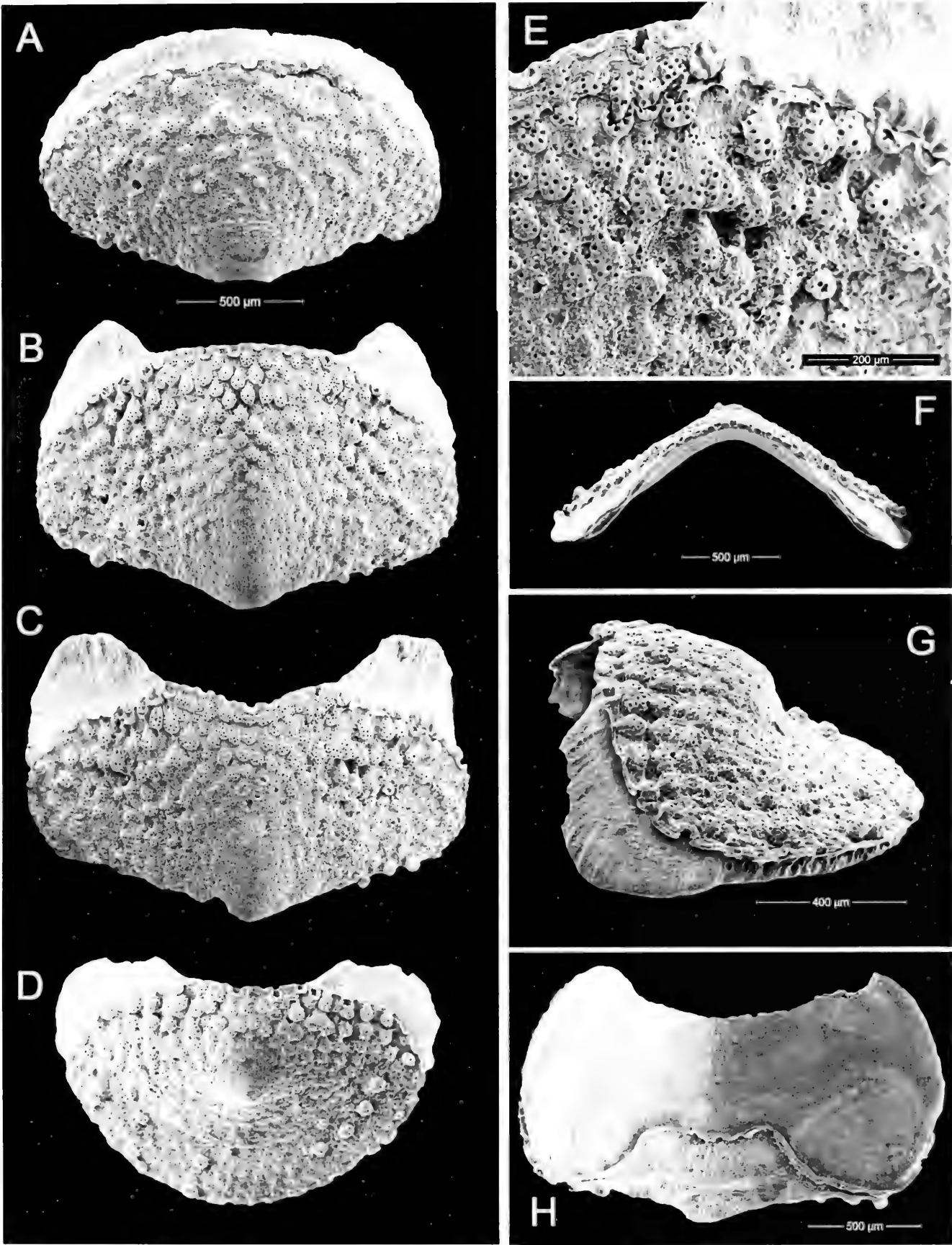
1979 *Hanleya multigranosa* (non Reuss) – Sabelli & Taviani, p.

161, pl. 1, fig. 4 (Torrente Stirone, Pleistocene) (fide Sirenko, 2014).  
1998 *Hanleya hanleyi* – Dell’Angelo et al., 1998, p. 244, pl. 2 fig. 1-2 (partim, “Favignana Island, Secca del Toro; “Sicilian Channel, Banco Scuso”).  
1999 *Hanleya hanleyi* – Dell’Angelo & Smriglio, p. 85, pl. 25 figs A-B, E-F, H, pl. 26 figs K, L-P (partim, “Marettimo isl.”, “Genova Boccadasse”; “Sicilian Channel, Banco Scuso”).  
2014 *Hanleya mediterranea* – Sirenko, p. 11, figs 6-8A-J (“Prinkipo”, Turkey and “Begur”, Spain).

Id Map	Country	sampling site	spm/valves	width or body length (mm)	depth (m)	repository	figs	references
1	Spain	Alboran Island	4 valves (2I,2P)	W 2.2 max	80-150	BD		this study
2	Spain	Begur, Girona	1 spm	BL 4.7	200-300	ZISP 2201		Sirenko 2014, Holotype: fig. 6-7
3	Spain	Minorca Island N.E.	1 valve (1P)	W 2.3	285	SB		this study
4	France	Corsica, Bonifacio	1 valve (II)	W 2	70	BD		this study
5	Italy	Imperia	1 spm	BD 3.9	100	BD		this study
6	Italy	Genova Boccadasse	2 spm (1 disarticulated)	BL 1.8	50-60	BD		Dell’Angelo & Smriglio 1999: pl. 25 fig. F, pl. 26 figs L-P (spm disarticulated, as <i>H. hanleyi</i> )
6	Italy	Genova Boccadasse	1 spm	BL 2	50-60	BD	2.C	this study
6	Italy	Genova Boccadasse	1 valve (II)	W 1.8	50-60	BD		this study
7	Italy	Tuscan Archipelago	2 spm	BL 2, 4.8	60-100	BD		this study
7	Italy	Tuscan Archipelago	1 valve (II)	1.5	60-100	BD		this study
7	Italy	Capraia Island	2 spm	BL 8 max		SB		Scaperrotta et al. 2015: fig. p. 33 as <i>H. hanleyi</i> (spm BL 6 and 8 mm)
7	Italy	Capraia Island	3 valves (2I,1P)	W 2.2 max	80-180	BD		this study
7	Italy	Capraia Island	1 spm		200	FA		this study
7	Italy	Elba Island	4 valves (2I,2P)	W 3 max	70-100	BD		this study
7	Italy	Elba Island	2 valves (1A,1I)	W 1.6	23	BD		this study
7	Italy	Elba Isl., Porticciolo	2 valves (1A,1I)	W 3 max		BD	2.D	this study
7	Italy	Elba Isl., Secca di FONZA	1 valve (1P)	W 1.8	45	SB		this study
7	Italy	Giglio Island	1 valve (1P)	W 2.4	40-50	BD		this study
7	Italy	Gorgona Island	7 valves (1A,4I,2P)	W 3.5 max	80-120	BD		this study
7	Italy	Le Formiche di Grosseto	valves	W 2.6	50	SB		this study
7	Italy	Montecristo Island	3 (1A,2I)	W 2.3 max	105	BD	2.F	this study
7	Italy	Pianosa Island	2 (1I,1P)	W 2.5 max	90-100	BD		this study
7	Italy	Secche di Vada	2 valves (2P)	W 2.5 max		BD		this study
8	Italy	Argentario	1 valve (II)	W 1.7	34	BD		this study
9	Italy	Tor Paterno	1 spm		72	BA		this study
10	Italy	Pantelleria Island	1 valve (1P)	W 1.5	300	BD		this study
10	Italy	Pantelleria Island	1 valve (1A)	W 4	50	SB		this study
11	Italy	Adventure Bank, off Mazara	1P	1.5	200-220	BD		this study
12	Italy	Favignana Island	1 valve (1A)	W 2	80	SB		this study
12	Italy	Favignana Island, Secca del Toro	1 valve (II)	W 2.5	62	BD		Dell’Angelo et al. 1998: pl. 2 fig. 1
12	Italy	Marettimo Island	2 (1A,1I)	W 1.6	92	BD		Dell’Angelo & Smriglio 1999: pl. 25 figs A-B (as <i>H. hanleyi</i> )

The Mediterranean distribution of *Hanleya hanleyi* (Bean in Thorpe, 1844) and *H. mediterranea* Sirenko, 2014 (Polyplacophora)





**Fig. 3. A-H.** *Hanleya mediterranea* Sirenko, 2014, ZISP 2422, specimen disarticulated for SEM analysis (figs 2. A-B). **A.** Head valve, width 1.6 mm, dorsal view **B.** Valve II, width 1.7 mm, dorsal view. **C.** Valve V, width 1.8 mm, dorsal view. **D.** Tail valve, width 1.4 mm, dorsal view. **E.** Valve V, close-up of surface ornamentation of pleural area. **F.** Intermediate valve, frontal view. **G.** Tail valve, lateral view. **H.** Intermediate valve, ventral view.

**Fig. 3. A-H.** *Hanleya mediterranea* Sirenko, 2014, ZISP 2422, esemplare disarticolato per l'analisi al SEM (figs 2. A-B). **A.** Piastra anteriore, larghezza 1.6 mm, vista dorsale **B.** Piastra II, larghezza 1.7 mm, vista dorsale. **C.** Piastra V, larghezza 1.8 mm, vista dorsale. **D.** Piastra posteriore, larghezza 1.4 mm, vista dorsale **E.** Piastra V, dettaglio dell'ornamentazione dell'area pleurale. **F.** Piastra intermedia, vista frontale **G.** Piastra posteriore, vista laterale **H.** Piastra intermedia, vista ventrale

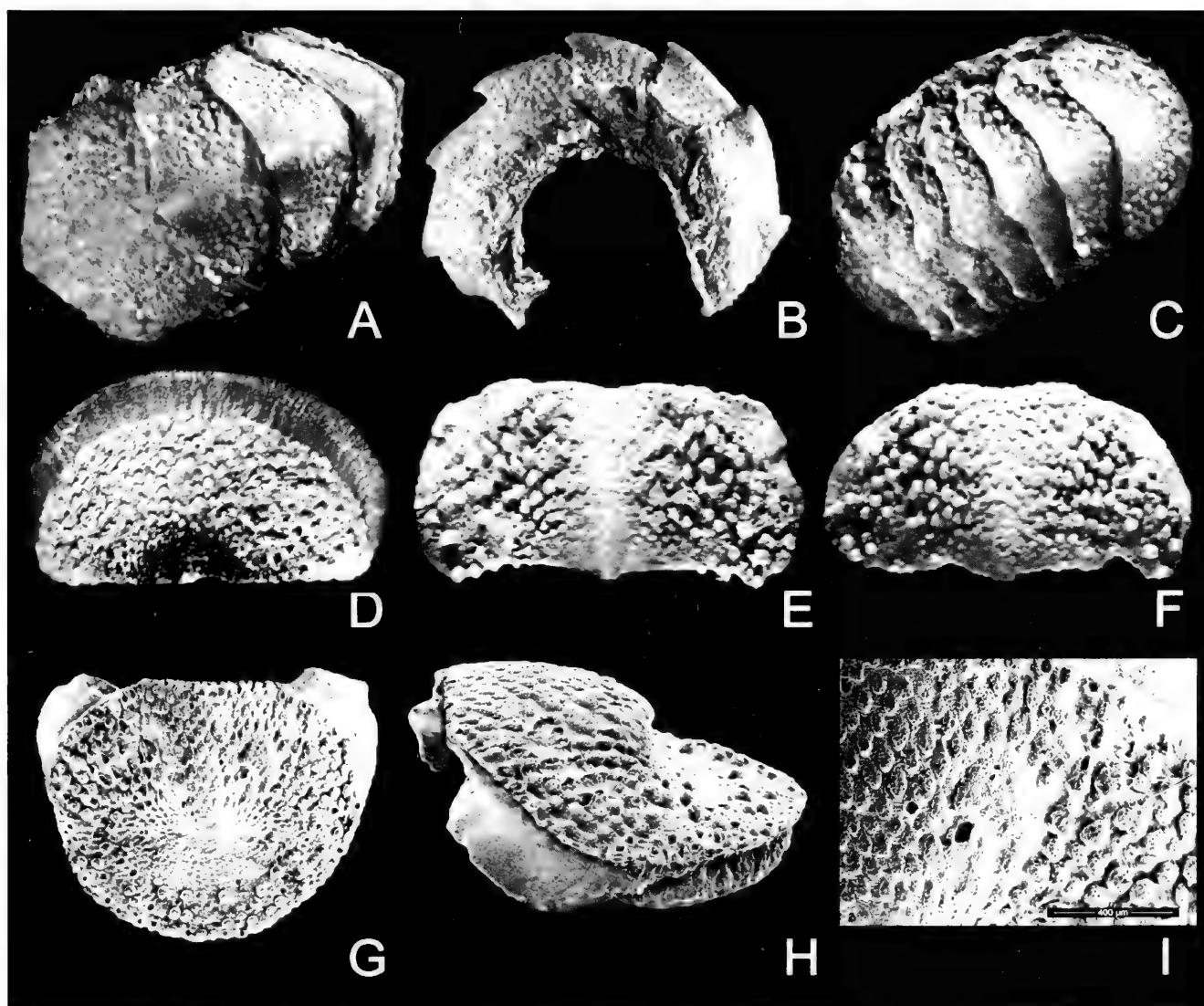
## Remarks

*Hanleya hanleyi* is characterized by the sculpture of the pleural areas of intermediate valves and antemucronal area of the tail valve consisting of longitudinal series of small, roundish to oval granules (length 75-100  $\mu$ m), with narrow interstices, fine and close set on jugum, getting larger and posteriorly converging towards side margins. Each granule contains one megalaesthete surrounded by 8-12 micraesthetes (Sirenko et al. 2016).

The sculpture shows a certain variability, the longitudinal series of granules are more or less regular, some split (Fig. 1. D) and some converge towards the jugal area (Fig. 1. E), the interstices can be more or less narrow (compare Figs 1. E and 1. G). The figured valve from Bosa shows a structure of the granules with one

megalaesthete surrounded by up to 8 micraesthetes (Fig. 1. I), agreeing with the species' description. The only difference is that the distribution of the micraesthetes does not cover the entire margin of the granule (as for example in Sirenko et al., 2016: figs 2E, 5E), but seems to be concentrated on one half of the granule, leaving the other half almost always free from micraesthetes (Fig. 1. I).

*Hanleya hanleyi* has been found at depths from intertidal (rare) to 1680 m, often inside microcavities of blocks of organogenic material, in detritus from quite deep water, or on all kind of hard substrate, for instance dead shells and stones, also recorded in association with white corals and bathyal muds biocoenoses. In the Mediterranean Sea, it is more frequent between 40 and 400 m, as confirmed by the studied material (Table 1).



**Fig. 2. A-I.** *Hanleya mediterranea* Sirenko, 2014. **A, B.** Cetraro (Cosenza), ZISP 2422, whole specimen (disarticulated and coated for SEM analysis, figs 3-4), BL 3.5 mm, dorsal (A) and lateral (B) views. **C.** Boccadasse (Genova), whole specimen, BL 2 mm, dorsal view. **D.** Elba Island (Tuscan Archipelago), head valve, width 3 mm, dorsal view. **E.** Porto degli Infreschi (Salerno), intermediate valve, width 2.5 mm, dorsal view. **F.** Montecristo Island, intermediate valve, width 2.3 mm, dorsal view. **G-I.** Scilla (Reggio Calabria), ZISP 2423, tail valve, width 2.7 mm, dorsal (G) and lateral (H) views, and close-up of surface ornamentation of antemucronal area (I).

**Fig. 2. A-I.** *Hanleya mediterranea* Sirenko, 2014. **A, B.** Cetraro (Cosenza), ZISP 2422, esemplare intero (disarticolato e metallizzato per l'analisi al SEM, figs 3-4), BL 3.5 mm, viste dorsale (A) e laterale (B). **C.** Boccadasse (Genova), esemplare intero, BL 2 mm, vista dorsale. **D.** Isola d'Elba (Arcipelago toscano), piastra anteriore, larghezza 3 mm, vista dorsale. **E.** Porto degli Infreschi (Salerno), piastra intermedia, larghezza 2.5 mm, vista dorsale. **F.** Isola di Montecristo, piastra intermedia, larghezza 2.3 mm, vista dorsale. **G-I.** Scilla (Reggio Calabria), ZISP 2423, piastra posteriore, larghezza 2.7 mm, viste dorsale (G) e laterale (H) views e dettaglio dell'ornamentazione dell'area antemucronale (I).

<b>Id Map</b>	<b>Country</b>	<b>sampling site</b>	<b>spm/valves</b>	<b>width or body length (mm)</b>	<b>depth (m)</b>	<b>repository</b>	<b>figs</b>	<b>references</b>
A	Spain	St. Pol, Barcelona	1 spm			VB 2724B		Slieker 2000: p. 28, fig. 13
B	France	Marsiglia, Port Cros National Park	1 spm	BL 2.3 curled		BD		this study
C	Italy	Genova Boccadasse	6 spm	BL 6.5 max	50-60	BD	1.A-B	this study
C	Italy	Genova Boccadasse	1 spm	BL 6.3		DS		this study
C	Italy	Genova Boccadasse	1 valve (1I)	W 3.2		DS		this study
D	Italy	Alghero	1 valve (1A)	W 2.2	180	BD		this study
E	Italy	Bosa	9 (2A,5I,2P)	W 2 max	150-250	BD		this study
E	Italy	Bosa	1 valve (1I)	W 2	150-250	ZISP 2421	1.G-I	this study
F	Italy	Bocche di Bonifacio	3 valves (3I)	W 2.1 max	100	BD		Dell'Angelo & Smriglio 1999: pl. 25 figs C-D, pl. 26 fig. I
F	France	Corsica, Bonifacio	1 valve (1A)	W 2.3	70	BD		this study
G	Italy	between Capo Corso and Capraia Island	3 valves (1A,2I)	W 3.5 max	350-500	BD	1.D-E	Dell'Angelo & Giusti 1997: p. 51, fig. 2
H	Italy	Capraia Island	1 spm	BL 4.5	80-100	BD		this study
H	Italy	Capraia Island	2 valves (2I)	W 4.2 max	290-420	BD		this study
H	Italy	Capraia Island	2 spm	BL 3.5 max		SB		Scaperrotta et al. 2015: fig. p. 33 (spm BL 3.5 and 2 mm)
H	Italy	Capraia Island	1 spm	BL 4.1	120	GDP		Dell'Angelo & Smriglio 1999: p. 211, fig. 36
H	Italy	Capraia Island	3 spm	BL 6 max		MMP		Cossignani & Ardochini 2011: p. 68, figs e-f
H	Italy	Capraia Island	1 valve (1I)	W 2.4	350	SB		this study
H	Italy	Tuscan Archipelago	1 spm	BL 5.5	40-55	BD		this study
H	Italy	Tuscan Archipelago	1 spm	BL 2.5	deep	SB	1.C	this study
H	Italy	Tuscan Archipelago	1 spm	BL 4.5	deep	SB		this study
H	Italy	Le Formiche di Grosseto	4 spm	BL 9 max	100-120	MZB 002623		Sabelli 1972: p. 98, figs 3-6; Sabelli 1974: figs 1-2
H	Italy	Pianosa Island	1 valve (1P)	W 1.5	300-350	BD	1.F	this study
H	Italy	Tuscan Archipelago	1 spm		deep			Bogi et al. 1980: p. 16, fig. p. 17
I	Italy	Anzio	4 spm	BL 6 max		MMP		Cossignani & Ardochini 2011: p. 68, figs a-d
J	Italy	gulf of Naples, Bocca Piccola	1 spm	BL 10 mm	140			Malatesta 1962: p. 154, fig. 9
K	Tunisia	Korba Bank	1 spm	BL 6 mm	35-40	MZB		Sabelli 1972: p. 98, fig. 2
L	Italy	Fossa di Pantelleria	1 valve (1I)		396/241	MZB		Sabelli 1972: p. 98, fig. 1
L	Italy	Sicily Channell	1 valve (1P)	W 8.2	328/704	BD		Dell'Angelo et al. 1998: p. 244, pl. 1, fig. 10 (as <i>H. nagelfar</i> )
M	Italy	Scilla cave	spm	BL 2.5	52	SB		this study
N	Italy	Civitanova Marche	1 spm	BL 5.2	60	BD		Dell'Angelo & Smriglio 1999: p. 211, fig. 34
O	Croatia	Punte Bianche (Kleciach)	2 spm + 1 disarticulated			MCZR-M-12858		Monterosato 1880: p. 66; Gagliani 1985; fig. pl. 3
P	Italy	Porto Cesareo	2 spm	BL 3, 4	80-100	GM		this study
Q	Israel	Haifa Bay	1 spm		67	MZB 002791		this study
Q	Israel	off Haifa	1 valve		77-92	NHMW		Albano et al. 2020

**Table 1.** *Hanleya hanleyi*: summary of the material examined. Size measurements refer to body length (BL) for complete specimens and width (W) for single valves (A = anterior, I = intermediate, P = posterior).

**Tab. 1.** *Hanleya hanleyi*: riepilogo del materiale esaminato. Le misure si riferiscono alla lunghezza dell'esemplare (BL) per gli individui completi ed alla larghezza (W) per le piastre singole (A = anteriore, I = intermedia, P = posteriore).

## Results

### *Hanleya hanleyi* (Bean in Thorpe, 1844) (Fig. 1)

- 1880 *Acanthopleura hanleyi* – Monterosato, p. 66 ("Puntebianche", Adriatic Sea).  
1962 *Hanleya hanleyi* – Malatesta, p. 154, fig. 9 ("Bocca Piccola", Gulf of Naples).  
1972 *Hanleya hanleyi* – Sabelli, p. 97, fig. 1-6 ("Fossa di Pantelleria", "Banco di Korba", "Le Formiche di Grosseto").  
1974 *Hanleya hanleyi* – Sabelli, fig. 1-13 ("Le Formiche di Grosseto").  
1980 *Hanleya hanleyi* – Bogi et al., p. 16, fig. p. 17 ("Tuscan Archipelago").  
1985 *Hanleya hanleyi* – Gaglioli, p. V, fig. pl. 3 ("Punte Bianche").  
1992 *Hanleya hanleyi* – Cossignani et al., p. 17, fig. 003 ("Central Adriatic Sea").  
1997 *Hanleya hanleyi* – Dell'Angelo & Giusti, p. 51, fig. 2 ("Sicilian Channell").  
1998 *Hanleya nagelfar* (Lovén, 1846) – Dell'Angelo et al., p. 244, pl. 1, fig. 10

- 1999 *Hanleya hanleyi* – Dell'Angelo & Smriglio, p. 85, pl. 25 figs C-D, G pl. 26 figs. I-J, color figs 34-36 (*partim*, "Bocche di Bonifacio", "Civitanova Marche" and "Capraia Island").  
2000 *Hanleya hanleyi* – Sliker, p. 28, fig. 13 ("St. Pol", Spain).  
2011 *Hanleya hanleyi* – Cossignani & Ardovini: p. 68, fig. a-f ("Anzio", "Capraia Island").  
2015 *Hanleya hanleyi* – Scaperrotta et al.: p. 35 (*partim*, "Capraia Island").

### Type material

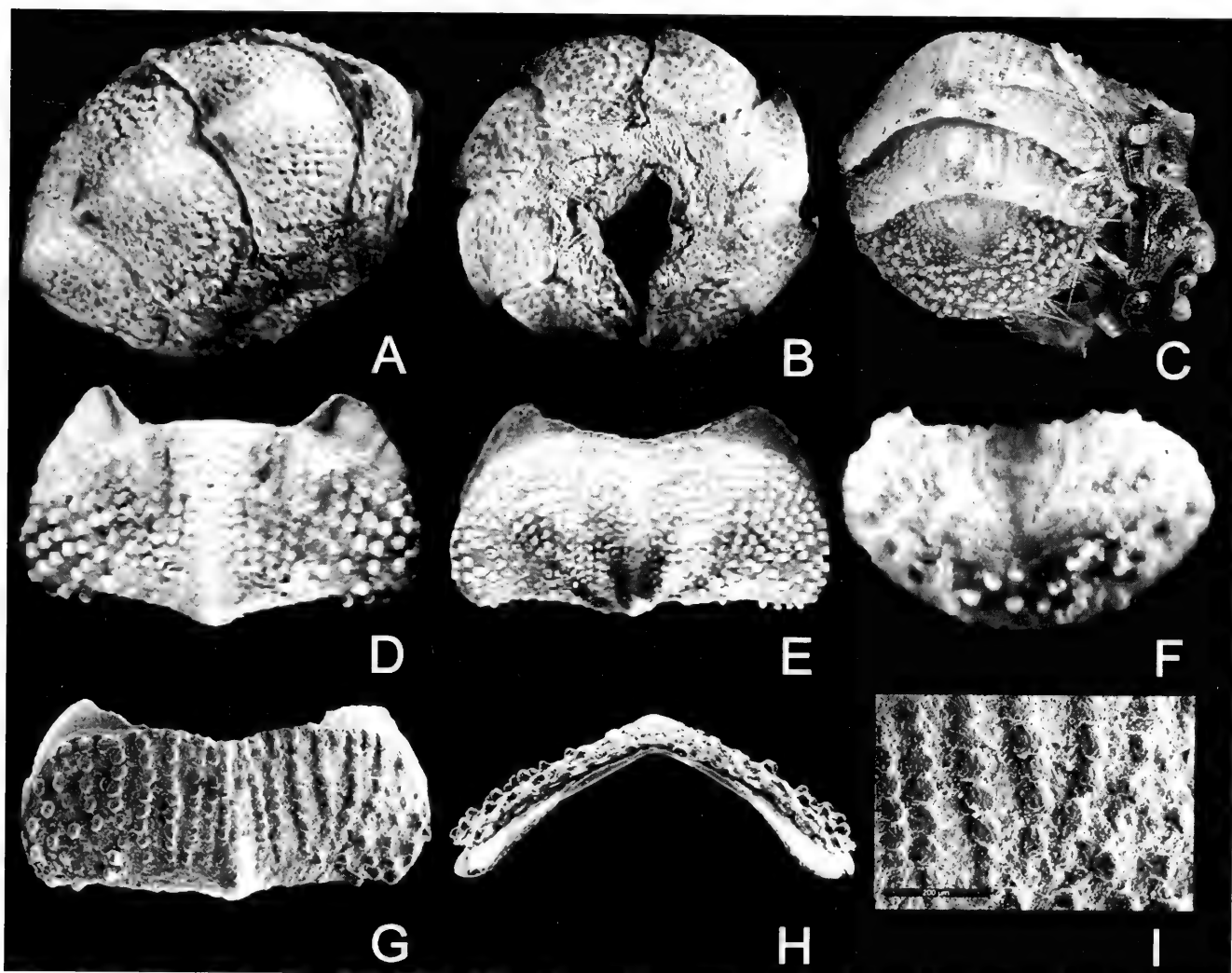
Syntype of *H. hanleyi*: Scarborough Museums Trust, Woodend, Scarborough, U.K.

### Type locality

Scarborough, Yorkshire, England; intertidal.

### Material examined

An overview of all the material examined, both complete specimens and single valves, is provided in **Tab. 1**.



**Fig. 1. A-I.** *Hanleya hanleyi* (Bean in Thorpe, 1844). **A, B.** Boccadasse (Genova), whole specimen, BL 5 mm, dorsal (A) and lateral (B) views. **C.** Tuscan Archipelago, whole specimen, BL 2.5 mm, posterior view. **D, E.** S. Lucia Bank, Tuscan Archipelago, intermediate valves, width 2.5 mm (D) and 3.5 mm (E), dorsal views. **F.** Pianosa Island, Tuscan Archipelago, tail valve, width 1.5 mm, dorsal view. **G-I.** Bosa (Oristano), ZISP 2421, intermediate valve, width 2 mm, dorsal (G) and frontal (H) views, and close-up of surface ornamentation of pleural area (I).

**Fig. 1. A-I.** *Hanleya hanleyi* (Bean in Thorpe, 1844). **A-B.** Boccadasse (Genova), esemplare intero, BL 5 mm, viste dorsale (A) e laterale (B). **C.** Arcipelago toscano, esemplare intero, BL 2.5 mm, vista posteriore. **D-E.** Banco di S. Lucia, Arcipelago toscano, piastre intermedie, larghezza 2.5 mm (D) e 3.5 mm (E), viste dorsali. **F.** Isola di Pianosa, Arcipelago toscano, piastre posteriore, larghezza 1.5 mm, vista dorsale. **G-I.** Bosa (Oristano), ZISP 2421, piastra intermedia, larghezza 2 mm, viste dorsale (G) e frontale (H) e dettaglio dell'ornamentazione dell'area pleurale (I).

# The Mediterranean distribution of *Hanleya hanleyi* (Bean in Thorpe, 1844) and *H. mediterranea* Sirenko, 2014 (Polyplacophora)

Bruno Dell'Angelo\* (✉), Walter Renda#, Boris I. Sirenko°, Maurizio Sosso<sup>§</sup> & Salvatore Giacobbe<sup>§</sup>

\* Via Briscata 16, 16154, Genova, Italy, [bruno.dellangelo@chitons.it](mailto:bruno.dellangelo@chitons.it), (✉) corresponding author

# Via Bologna 18/A, 87032 Amantea (CS), Italy, [w.renda1@tin.it](mailto:w.renda1@tin.it)

° Zoological Institute, Russian Academy of Sciences, St. Petersburg 199034, Russia, [marine@zin.ru](mailto:marine@zin.ru)

<sup>§</sup> Via Bengasi 4, 16153 Genova, Italy, [sosmauri@gmail.com](mailto:sosmauri@gmail.com)

<sup>§</sup> Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Viale F. Stagno d'Alcontres 31, 98166 Messina, Italy, [sgiacobbe@unime.it](mailto:sgiacobbe@unime.it)

## Abstract

Two species of *Hanleya* have been reported to date living in the Mediterranean Sea: *H. hanleyi* (Bean in Thorpe, 1844) and the recently described *H. mediterranea* Sirenko, 2014. The critical analysis of published material and museum or private collections documents many cases of misidentification of *H. mediterranea*, at times being confused with *H. hanleyi*. Habitat data for the two species are discussed. Our study discloses that *H. mediterranea* has a wider distribution, while *H. hanleyi* seems restricted to the Central Mediterranean (except for a single report from Haifa).

## Key Words

Polyplacophora, Recent, *Hanleya*, Mediterranean Sea.

## Riassunto

[La distribuzione di *Hanleya hanleyi* (Bean in Thorpe, 1844) e *H. mediterranea* Sirenko, 2014 nel Mar Mediterraneo (Polyplacophora).] Due specie di *Hanleya* sono segnalate viventi nel Mediterraneo: *H. hanleyi* (Bean in Thorpe, 1844) e la specie da poco descritta *H. mediterranea* Sirenko, 2014. L'analisi critica del materiale pubblicato e di collezioni private o presenti nei musei rivela spesso una non corretta identificazione di *H. mediterranea*, riportata in precedenza come *H. hanleyi*. Vengono discussi i dati relativi all'habitat delle due specie. Questo studio rileva che *H. mediterranea* è presente nell'intero Mediterraneo, mentre la distribuzione di *H. hanleyi* sembra ristretta al Mediterraneo centrale.

## Parole chiave

Polyplacophora, viventi, *Hanleya*, Mar Mediterraneo.

## Introduction

The genus *Hanleya* Gray, 1857 is represented in the Mediterranean Sea by two living species at least: *H. hanleyi* (Bean in Thorpe, 1844) and *H. mediterranea* Sirenko, 2014. *Hanleya mediterranea* was recently described based upon four specimens from Bagur (Gerona, Spain, including the holotype) and off Prinkipo (Turkey). The present study is an update of the distributional range of *Hanleya mediterranea* in the Mediterranean basin (and of *H. hanleyi* as well), adding a number of new records along the Italian coasts through the revision of unpublished material and literature records.

## Material and methods

The material considered in this study comprises both complete specimens and loose valves, from sites covering the entire Mediterranean (Tables 1 and 2, Fig. 6). For the most part, this material is hosted in the collection of the senior author (BD), and was integrated by the examination of additional specimens from other collectors and institutions; the latter include the 'Museo Civico di Zoologia' (Rome), where the Collection Monterosato is preserved (Appolloni et al. 2018), and the 'Museo dell'Evoluzione' (formerly 'di Zoologia') of the University of Bologna.

The following abbreviations are used:

AV	Angelo Vazzana collection, Reggio Calabria, Italy.
BA	Bruno Amati collection, Roma, Italy.
BD	Bruno Dell'Angelo collection, Genova, Italy.
BEL	Benthic Ecology Laboratory, University of Messina, Italy
DS	Danilo Scuderi collection, Catania, Italy.
FA	Franco Agamennone collection, Pescara, Italy.
FR	Francesco Roncone collection, Cosenza, Italy.
GDP	Giacomo Di Pacot collection, Firenze, Italy.
GM	Gabriele Macrì collection, Otranto, Italy.
IRSN	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium.
MCZR	Museo Civico di Zoologia di Roma, Italy.
MMP	Museo Malacologico Piceno, Cupra Marittima, Italy.
MZB	Museo dell'Evoluzione dell'Università di Bologna, Italy.
NHMW	Naturhistorisches Museum Wien, Vienna, Austria.
SB	Stefano Bartolini collection, Firenze, Italy.
VB	Richard A. Van Belle collection, now in IRSN.
WR	Walter Renda collection, Amantea, Cosenza, Italy.
ZISP	Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia.

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1959 was described as “*Coquille très petite, cylindrique, lisse à embryon volumineux. Ressemble à Bacteridium Thiele 1931, mais en diffère par l’absence de stries spirales* (Saurin, 1959). Therefore the genus *Bacteridella*, characterised by the lack of spiral sculpture, is not suitable for the new species. Genus *Bacteridium* Thiele 1931 was described as a sub-genus of *Eulimella*, with type species *Eulimella praeclara* Thiele, 1925 from Western Sumatra. It was later raised to genus level by Peñas et al. (1996). WoRMS (accessed on 17/01/2021) placed *E. praeclara* in genus *Eulimella* and other species, characterized by elevated (Ebala-like) protoconch, gradate whorls and sub-triangular aperture, in the genus *Bacteridium*. The genus *Cima* Chaster, 1896 (type species *Odostomia minima* Jeffreys, 1858) is characterized by a cap-shaped protoconch, smooth or with axial ribs, with nucleus fully hidden in the first teleoconch whorl, teleoconch with flexuous growth lines, without spiral sculpture in the type species. *Cima cylindrica* (Jeffreys, 1856) shows a spiral sculpture occupying the abapical portion (Oliver et al., 2015) or almost the full whorl height (Oliver et al., 2012). The placement of the new species in this genus is considered inappropriate because it has a more elevated protoconch with partially exposed nucleus and straight instead of flexuous growth lines. The genus *Eulimella* Forbes & McAndrew, 1846 (type species *Eulima macandrei* Forbes, 1844 [= *Eulimella scillae* (Scacchi, 1835)] has been used by recent Authors (e.g. Peñas & Rolán, 1997) in a wide sense, with the inclusion of even rather different species. The spiral sculpture is normally present in some Mediterranean *Eulimella* species (e.g. *E. scillae*) or present only in some deep-sea living populations (e.g. *E. acicula* (Philippi, 1836)). In both cases, it is an extremely fine spiral striation, very different from the few furrows present in the new species.

Among the Mediterranean species, three of them, belonging to different genera, show some similarity: *Cima cylindrica* (Jeffreys, 1856), *Ebala nitidissima* (Montagu, 1803) and *Careliopsis modesta* (de Folin, 1870). Despite of its small size, *Cima cylindrica* (Fig. 1. F) is a well-known species, figured by several Authors (Aartsen, 1981; Scuderi & Criscione, 2011; Oliver et al., 2012; Giannuzzi Savelli et al., 2014; Oliver et al., 2015; Scaperrotta et al., 2016). It shows an outline similar to the new species and may be easily separated for the helmet-like protoconch, that in the new species is wider and more elevate, the flexuous (proso-cyrt) instead of straight growth lines, the more superficial spiral sculpture and the elliptical instead of rounded aperture. *Ebala nitidissima* differs for the more conical outline, the elevated protoconch with fully exposed nucleus, the narrower first teleoconch whorl and the more delicate and superficial spiral sculpture. *Careliopsis modesta* (Fig. 1. G) is much larger, having 3.5 whorls at 2.7 mm high, the protoconch diameter in front view is about 500 µm vs. 160 µm and there is an axial sculpture of flat ribs and a stronger spiral sculpture passing over the ribs.

*Eulimella gofasi* (Schander, 1994) from Angola to Senegal (Schander, 1994; Peñas & Rolán, 1997) mainly differs for having much more spiral furrows (about 20 against 5-12

on penultimate whorl), for the protoconch coiled at about 90° and for a more adapically restricted whorl profile with a well-marked subsutural cord.

*Turbonilla* (*Cingulina*) *callista* Bartsch, 1915 from South Africa has only two spiral furrows and a more conical outline. *Turbonilla* (*Careliopsis*) *carifa* Bartsch, 1915 from South Africa shows a similar number of spiral furrows, but is bigger (height = 2.1 mm with 5 whorls), more conical, with higher and faster growing whorls, shows spiral sculpture also on the base and last whorl occupies about 53% against 44% of total height. *Eulimella erecta* Thiele, 1925 from South Africa is much larger (8.5 mm). *Eulimella bacillus* Thiele, 1925 from Western Sumatra has a different outline with less convex, gradate whorls and a pyriform aperture. *Eulimella gedrosica* Melvill, 1904 from deep-water of Gulf of Oman differs for the higher whorls, more inclined suture and triangular, narrow aperture. The description states that it is “*arctissime et delicatissime striatis*”, but no further details are given on the spiral sculpture. *Cima urdunensis* Bandel, 2005 from Jordanian coast of the Red Sea, differs for lacking spiral furrows and for a stouter outline.

## Acknowledgements

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## Type material

Holotype: H = 1.6 mm, Amooopi Bay (south-eastern coast of Karpathos Island), depth 38 m, deposited at MNHN with the number MNHN-IM-2000-35883.

All paratypes from the type locality. Paratype 1 (FAP) **Fig. 1. C-E**, paratypes 2, 3 (PMF), paratypes 4, 5 (FSL), paratypes 6, 7 (CSL), paratype 8 (FAP).

## Type locality

Amooopi Bay (south-eastern coast of Karpathos Island), depth 38 m (coordinates 35°28'16.518" N, 27°11'46.013" E).

## Etymology

The species is named after Elisa, daughter of the second Author.

## Description

Shell of small size, slender, subcylindrical, with heterostrophic apex. Vitreous when fresh, with columella visible from outside. Protoconch of type B, with axis inclined of about 130° with respect to shell axis, about 25% of the nucleus is out of the first teleoconch whorl. Protoconch smooth, having a diameter of about 150 µm, measured in top view, and about 160 µm in front view. Teleoconch with about 5.7 whorls, convex, separate by a well-marked suture, inclined of about 10° with respect to shell axis. A subsutural cordlet makes the suture

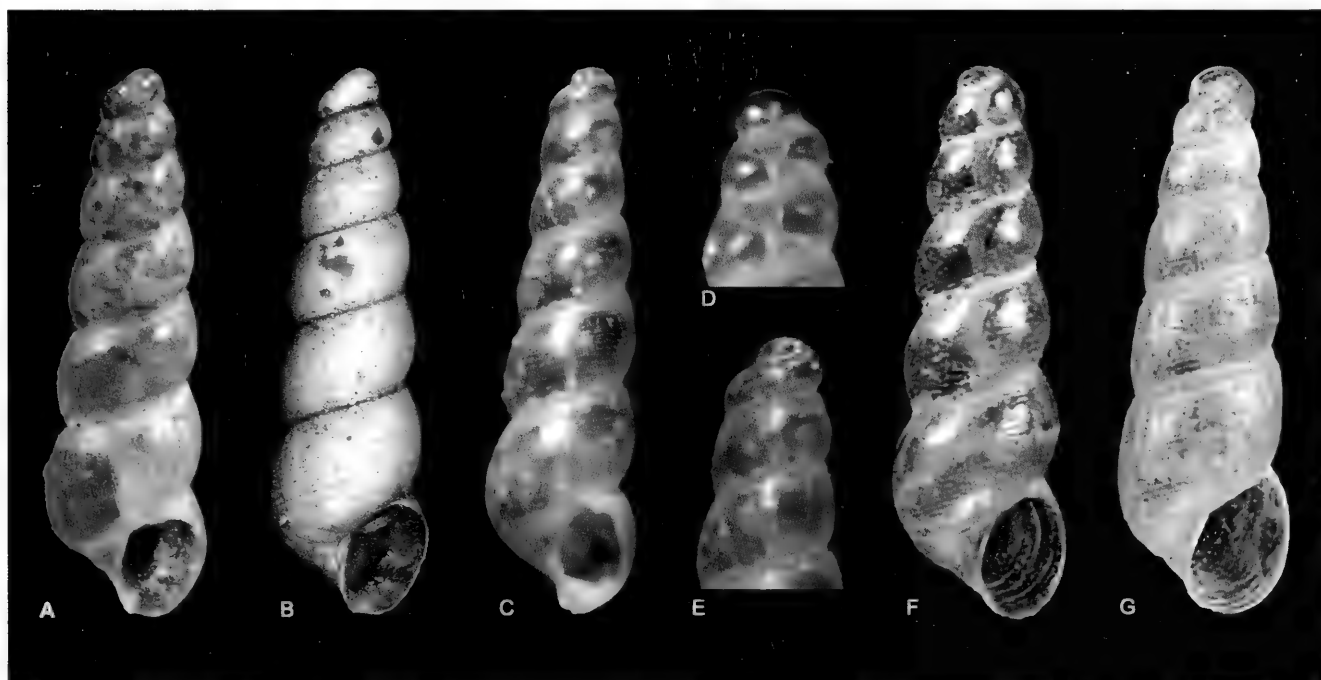
more evident. The initial 2-2.5 whorls are smooth, then appears the spiral sculpture, that is variable: the holotype shows on the penultimate whorl two groups of three furrows, separated by a smooth central portion, and eight furrows at the beginning of last whorl, while in other specimens the spiral sculpture arrives to cover the full whorl height, with about 15 furrows at the end of penultimate whorl, a little more crowded adapically. Axial sculpture consisting of straight, slightly prosocline growth lines, more evident near the adapical suture, where they make a very delicate granulation. The growth lines are also present in the bottom of furrows. Aperture rounded, columella vertical. The base is smooth, with only very weak sign of growth lines. Operculum and soft parts unknown.

## Distribution

At present, the species is known only for the south-eastern coasts of the Karpathos island.

## Discussion

The generic placement of the new species is not clear, due to the cylindrical outline and sculpture. The general outline recalls genus *Henrya* Bartsch, 1947, having as type species *H. henryi* Bartsch, 1947, recent, Caribbean. This genus has been moved by Rosenberg et al. (2009) to Murchisonellidae Casey, 1904, due to flexuous growth lines. The new species recalls *Bacteridella gofasi* Schander, 1994, that was later moved by Peñas & Rolán (1997) to genus *Eulimella*. Genus *Bacteridella* Saurin,



**Fig. 1. A, B.** *Eulimella elisae* n. sp., Holotype (MNHN-IM-2000-35883), H = 1.6 mm, Amooopi bay (Karpathos, Greece), 38 m; **C-E.** *Eulimella elisae* n. sp., Paratype 1, H = 1.7 mm, Amooopi bay (Karpathos, Greece), 38 m; **F.** *Cima cylindrica* (Jeffreys, 1856), H = 1.6 mm, Protaras (Cipro). **G.** *Careliopsis modesta* (de Folin, 1870), H = 2 mm, Cap Morgiu, Marsiglia.

**Fig. 1. A-B.** *Eulimella elisae* n. sp., Olotipo (MNHN-IM-2000-35883), H = 1,6 mm, Amooopi bay (Karpathos, Grecia), 38 m; **C-E.** *Eulimella elisae* n. sp., Paratipo 1, H = 1,7 mm, Amooopi bay (Karpathos, Grecia), 38 m; **F.** *Cima cylindrica* (Jeffreys, 1856), H = 1,6 mm, Protaras (Cipro). **G.** *Careliopsis modesta* (de Folin, 1870), H = 2 mm, Cap Morgiu, Marsiglia.

# *Eulimella elisae* n. sp. (Gastropoda: Pyramidellidae) from the Eastern Aegean Sea

Pasquale Micali\* (✉), Franco Siragusa<sup>#</sup> & Franco Agamennone<sup>°</sup>

\*Via Papiria, 17, 61032  
Fano (PU), Italy,  
lino.micali@virgilio.it, (✉)  
corresponding author

<sup>#</sup>Via Coccoluto Ferrigni, 44,  
57125 Livorno, Italy,  
franco.siragusa1@gmail.com

<sup>°</sup>Via Quarto dei Mille, 15,  
65122 Pescara, Italy,  
info@studioagamennone.it

## Abstract

The new species *Eulimella elisae* n. sp. is described based on material found in shellgrit samples manually collected at depths of 38 m along the South East coasts of Karpathos Island (Greece). The new species is characterized by the small size, subcylindrical outline, type B apex with nucleus emerging of about 25% from first teleoconch whorl and presence of spiral furrows (about 12 on penultimate whorl) covering the whole whorl height. We discuss the differences from the Mediterranean species *Cima cylindrica* (Jeffreys, 1856), *Ebala nitidissima* (Montagu, 1803) and *Careliopsis modesta* (de Folin, 1870), from the West African *Bacteridella gofasi* Schander, 1994, and from various Indo-Pacific species.

## Key words

*Eulimella elisae*, new species, taxonomy, Eastern Mediterranean Sea, Greece.

## Riassunto

[*Eulimella elisae* n. sp. (Gastropoda: Pyramidellidae) dal Mar Egeo orientale]. Viene descritta una nuova specie *Eulimella elisae* n. sp., basata su materiale rinvenuto in campioni di detrito raccolti manualmente alla profondità di 38 m, lungo le coste sud-orientali dell'Isola di Karpathos (Grecia). La nuova specie è caratterizzata dalle ridotte dimensioni, il profilo subcilindrico, la protoconca di tipo B con nucleo emergente di circa il 25% dal primo giro di teleoconca e dalla presenza di solchi spirali (circa 12 sul penultimo giro), distribuiti su tutta l'altezza del giro. Sono discusse le differenze dalle specie mediterranee *Cima cylindrica* (Jeffreys, 1856), *Ebala nitidissima* (Montagu, 1803) e *Careliopsis modesta* (de Folin, 1870), da *Bacteridella gofasi* Schander, 1994 dell'Africa nord-occidentale e da varie specie Indo-pacifiche.

## Parole chiave

*Eulimella elisae*, nuova specie, tassonomia, Mediterraneo orientale, Grecia.

## Introduction

The material collected by the Authors and some other malacologists at Karpathos Island on August 2016, provided several interesting species, among which two newly described (Micali et al., 2017; Agamennone et al., 2020a; Agamennone et al., 2020b). Additional species are waiting for a proper study. One of these is here described as new. Due to the presence of several Indo-Pacific species in the eastern Mediterranean, the possibility of facing a new alien species is very realistic, so an extensive search through the published literature was carried out. Recent investigations and publication of new species are proving that the malacofauna of the Eastern Mediterranean is still poorly explored (Albano et al., 2020).

## Material and methods

The specimens investigated were found by examining under the stereomicroscope about 50 kg of marine sediment taken manually by SCUBA diving. The material was collected at Amooopi Bay (south-eastern coast of Karpathos Island), depth 38 m (coordinates 35°28'16.518" N, 27°11'46.013" E), at the base of an emerging rock, lacking evident macro-algal formations in the upper

level, but with coralline formations at lower level. The sediment was detritic, slightly muddy, containing remains of death organisms from the upper levels. The description of the type of protoconch follows Schander (1994). Protoconch diameter was measured in top view, as in Peñas & Rolán (2010, fig. 3B). Holotype images by Philippe Maestrati (MNHN) using the Dun, Inc. BK PLUS Digital Imaging System and SEM.

## Abbreviations and acronyms

SEM: scanning electron microscope. H = maximum height (in mm). W: maximum width (in mm).

MNHN = Muséum National d'Histoire Naturelle, Paris.

CSL = Carlo Sbrana collection, Livorno, Italy. FAP = Franco Agamennone collection, Pescara, Italy.

SFL = Franco Siragusa collection, Livorno, Italy. PMF = Pasquale Micali collection, Fano, Italy.

## Systematics

Family Pyramidellidae J. E. Gray, 1840  
Genus *Eulimella* Forbes & McAndrew, 1846

*Eulimella elisae* n. sp.  
(Fig. 1. A, B)

onies of the genus *Eudendrium* and other nudibranch species associated with them, such as *F. affinis* and *C. peregrina*, although, the abundant presence of these organisms does not always correlate with the occurrence of *D. banyulensis*, as already noted by Betti (2011), suggesting that other factors may be at play.

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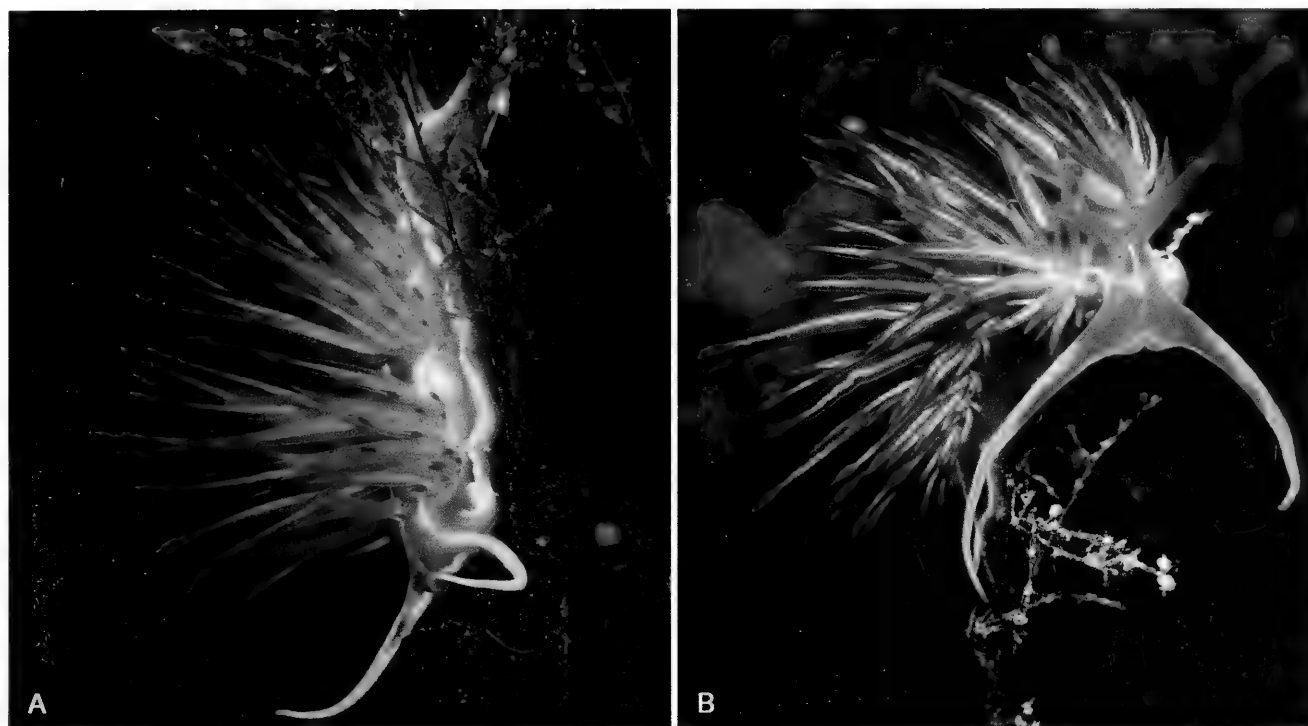
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**Fig. 5.** Two specimens of *D. banyulensis* observed in Santa Maria La Scala, Sicily, Italy, in the defensive hedgehog shape with their long cerata (photos A. Lombardo).

**Fig. 5.** Due esemplari di *D. banyulensis* osservati a Santa Maria La Scala, Sicilia, Italia, nella forma difensiva a riccio con i loro lunghi cerata (foto A. Lombardo).

## Discussion

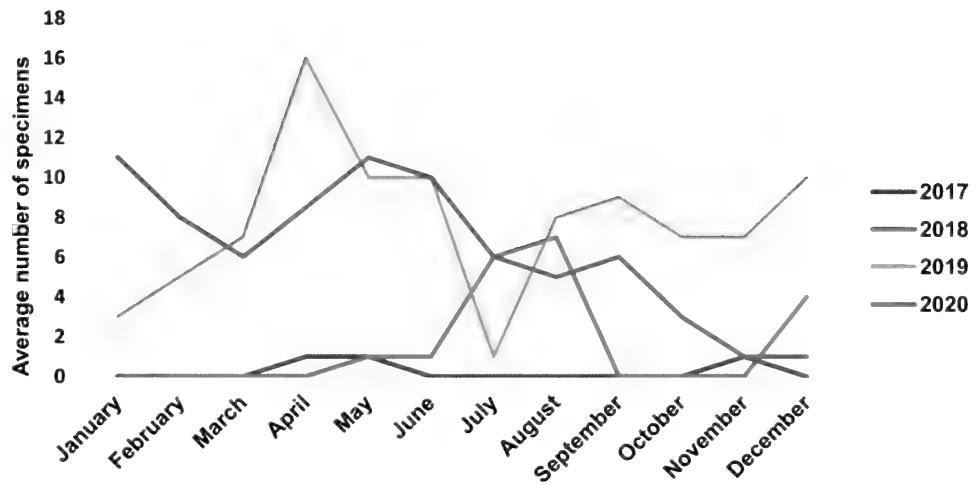
In the literature, *Dondice banyulensis* is a species documented especially during summer (Portmann & Sandmeier, 1960; García & García, 1984; Betti, 2011). On the contrary, Ballesteros et al. (2021) highlighted that this nudibranch can be present all year-round, as also observed in the present study. Indeed, in 2018 *D. banyulensis* was observed mainly in the summer months, while in 2019 and 2020, several specimens were documented in almost all months of the year. This evidence could depend on the fact that its principal sources of food are the hydrozoans of the genus *Eudendrium*, which can be present all year-round too. For example, *E. racemosum* and *E. glomeratum* Picard, 1952 alternate throughout the year: *E. racemosum*'s colonies are active from April until autumn, while those of *E. glomeratum* are active from autumn to April (Boero, 1984; Bavestrello et al., 2006). Therefore, this nudibranch has at its disposal its source of food during the whole year. At the same time, *D. banyulensis* bases its supply, not only on hydrozoans but also on other nudibranchs, such as *F. affinis* and *C. peregrina* that feed on the same hydrozoans as *D. banyulensis* (García & García, 1984; Betti, 2011).

The site of Santa Maria La Scala presents both an abundant population of *Eudendrium* spp. and several specimens of *F. affinis* and *C. peregrina* in almost all months of the year, at the same bathymetric ranges where most of *D. banyulensis*'s specimens were found (Lombardo & Marletta, 2020). Therefore, this site has all the features to sustain *D. banyulensis*'s population. Indeed, probably this nudibranch bases its post-larval food supply on

hydrozoans. Subsequently, reached a larger size, it becomes capable to prey other nudibranchs, such as *F. affinis* and *C. peregrina* (the most common nudibranchs on *Eudendrium* spp. in the study areas). The site of Catania presents all the conditions necessary to support *D. banyulensis*'s population too. Indeed, this site hosts large *Eudendrium* spp. and *F. affinis* populations, as demonstrated by Lombardo & Marletta (2020). Nevertheless, in this site, the small *D. banyulensis*'s population observed could depend on low larval recruitment. In fact, Clark (1975) highlighted that the principal component of the recruitment in nudibranchs' populations is the arrival of allochthonous larvae. Consequently, probably in Santa Maria La Scala many more *D. banyulensis*'s larvae arrived and found optimal conditions to live than the other sites examined in this study. Instead, the site of Santa Tecla, in addition to having experienced low larval recruitment, did not present a consistent *Eudendrium* spp. population to the sustenance of the first post-larval stages of *D. banyulensis*. Moreover, Santa Tecla hosts small populations of *F. affinis* and *C. peregrina* (Lombardo & Marletta 2020). Therefore, we assume that these environmental conditions cannot support the later life stages of *D. banyulensis*. Moreover, in these sites another factor that could determine this difference in the population size is the mortality rate. Indeed, the three study areas might present different mortality rates of both larvae and juveniles. Consequently, there is still uncertainty on the causes of this numerical disparity.

In conclusion, *D. banyulensis* seems to be a species present all year-round in ecosystems rich in hydrozoan col-

## Santa Maria La Scala



**Fig. 4:** Intra-annual variation in abundance of *D. banyulensis* in Santa Maria La Scala, Sicily, Italy.

**Fig. 4.** Variazione annuale dell'abbondanza di *D. banyulensis* a Santa Maria La Scala, Sicilia, Italia.

to 7.75 individuals/dive and, then slightly decreased in 2020 (6.37 individuals/dive). Regarding the abundance of individuals between months (Fig. 4), almost no specimens were observed in 2017. In 2018, most of the individuals were found between June and September. Instead, the time of 2019 in which the highest average number of individuals was detected was between March and May. Then, the average number of individuals remained constant, except for July, in which an evident decrease was observed. Finally, in 2020, the average number of individuals was constant throughout the year, but it steadily decreased from June and started to disappear in November. Concerning the spawns, in 2017 the egg masses were documented only in May and November. In 2018, they were found in July, August and December, while in 2019 they were documented in all months of the year. Also in 2020, the egg masses were found almost all year-round. The breeding activity was only detected during 2019 (May, August and September) and 2020 (March, May, July and August).

In the site of Santa Maria La Scala, *D. banyulensis* was reported between 14.7 and 40.5 m of depth, often on *Eudendrium* spp., or crawling on different substrates such as the algae *Zonaria tournefortii* (J. V. Lamouroux) Montagne; *Halopteris scoparia* (Linnaeus) Sauvageau; *Sebdenia monardiana* (Montagne) Berthold; the bryozoan *Myriapora truncata* (Pallas, 1766); several sponges and sandy bottoms. Nearly always, the egg masses were laid on *Eudendrium* spp. and rarely on other substrates, as *Z. tournefortii* and *S. monardiana*. Between 2017 and 2019, almost all specimens were observed on rocky outcrops located between 32 and 38 m of depth. Indeed, these structures host several hydrozoans of the genus *Eudendrium* and other aeolidaceans as *Flabellina affinis* and *Cratena peregrina*. On the contrary, from 2019 and throughout 2020, fewer *D. banyulensis*'s individuals were observed in this area and more individuals were increasingly reported in shallower areas, reaching even 20 m of depth. In this last case, the individuals were often observed creeping on the seabed and not on the

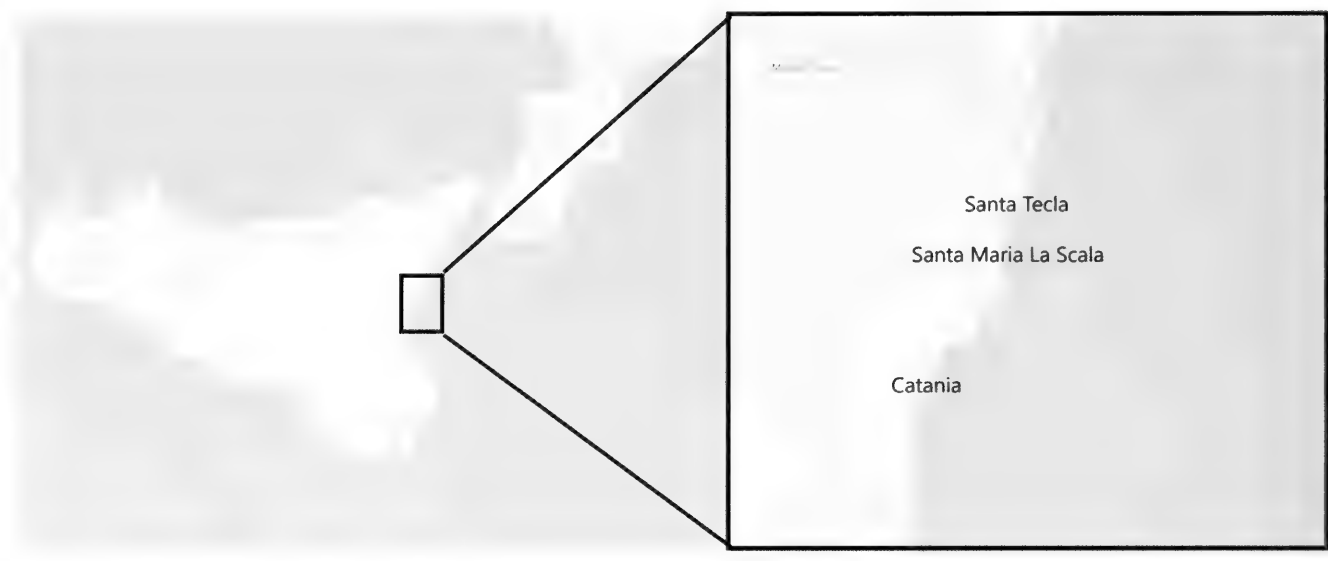
few *Eudendrium* spp. colonies present in this shallower area.

From a behavioral standpoint, *D. banyulensis* specimens observed in this study seemed active and vigorous, more rapid in the movements than *F. affinis* and *C. peregrina*. Moreover, when *D. banyulensis* was touched by the authors along the flanks of the body and on the head, it did not show escape reactions, as observed for *F. affinis* and *C. peregrina*. Sometimes, *D. banyulensis* assumed a defensive hedgehog shape with their long cerata (Fig. 5. A, B). On one occasion, a small specimen got in touch with a larger specimen, which, when touched by the smaller specimen, began to chase it, opening and closing its jaws, visible in transparency. The small specimen had a rapid escape reaction, crawling away from the larger specimen. Regarding the breeding activity, it was noted that during reproduction the individuals tend to erect their cerata in a hedgehog shape and usually one of the two specimens moves its cerata spasmodically with whip-like motions.

In Catania, a difference in *D. banyulensis*'s populations between Ognina and Bellatrix was observed. In particular, at the site of Bellatrix, a few large-sized individuals and their egg masses were always found between 32 and 35 m of depth, on the gorgonian *Paramuricea clavata* (Risso, 1826) that presented signs of necrosis with a progressive detachment of the living tissue. The exposed skeleton of the gorgonians was abundantly covered by epibiont hydroids of the genus *Eudendrium*, on which *D. banyulensis*'s individuals stood. In this area, there were also several specimens of *F. affinis* and *C. peregrina*. Instead, at the site of Ognina, small-sized *D. banyulensis*'s specimens, were rarely found on *Eudendrium* sp. between 9.1 and 35 m of depth.

Both in Catania and in Santa Maria La Scala, some large *D. banyulensis*'s specimens with a coloration of the body slightly different from that usually observed have been documented. Indeed, they had the body colored of a more opaque orange, with cerata and rhinophores presenting golden nuances.





**Fig. 2.** Geographical location of the study areas along the central-eastern coast of Sicily, Italy.

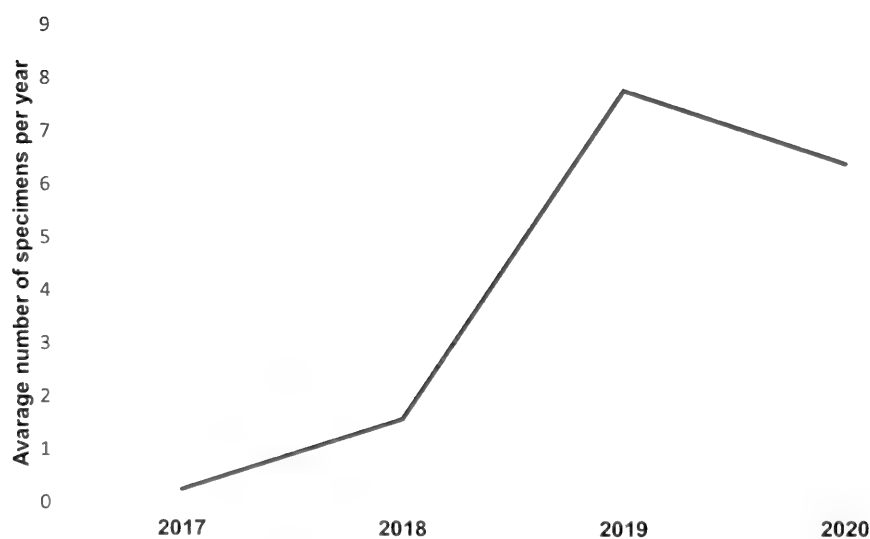
**Fig. 2.** Ubicazione geografica dell'area in studio lungo la costa centro-orientale della Sicilia, Italia.

(about 390 m) these two locations were considered as a single site listed from now as “Santa Tecla”. The last study site is Santa Maria La Scala (37°36’46.5” N - 15°10’31.4” E) located in the municipality of Acireale. This site presents intermediate conditions between those of Catania and Santa Tecla and was thus considered separately from the other sites. Data were collected through underwater visual census during scuba diving, twice a week for each year (if the weather conditions in winter allowed it), always between 9-11:30 am. A total of 311 dives (100 in Santa Maria La Scala, 119 in Catania and 92 in Santa Tecla) were conducted. Every scuba dive was carried out in the 0-45 m depth range, according to the seabed geomorphology, following the same path, and all *D. banyulensis* specimens and their egg masses were photographed with an Olympus TG-4 underwater camera and counted in situ. Moreover, for each specimen, information on depth and substrate was annotated. Through Excel, the average number of specimens per month for each site (for every year of study) was calculated, and graphics were produced. Due to

the Covid-19 lockdown, the diving activities were not performed in April 2020; consequently, the mean number of *D. banyulensis* specimens in this month was calculated averaging the number of specimens between March 2020 and May 2020.

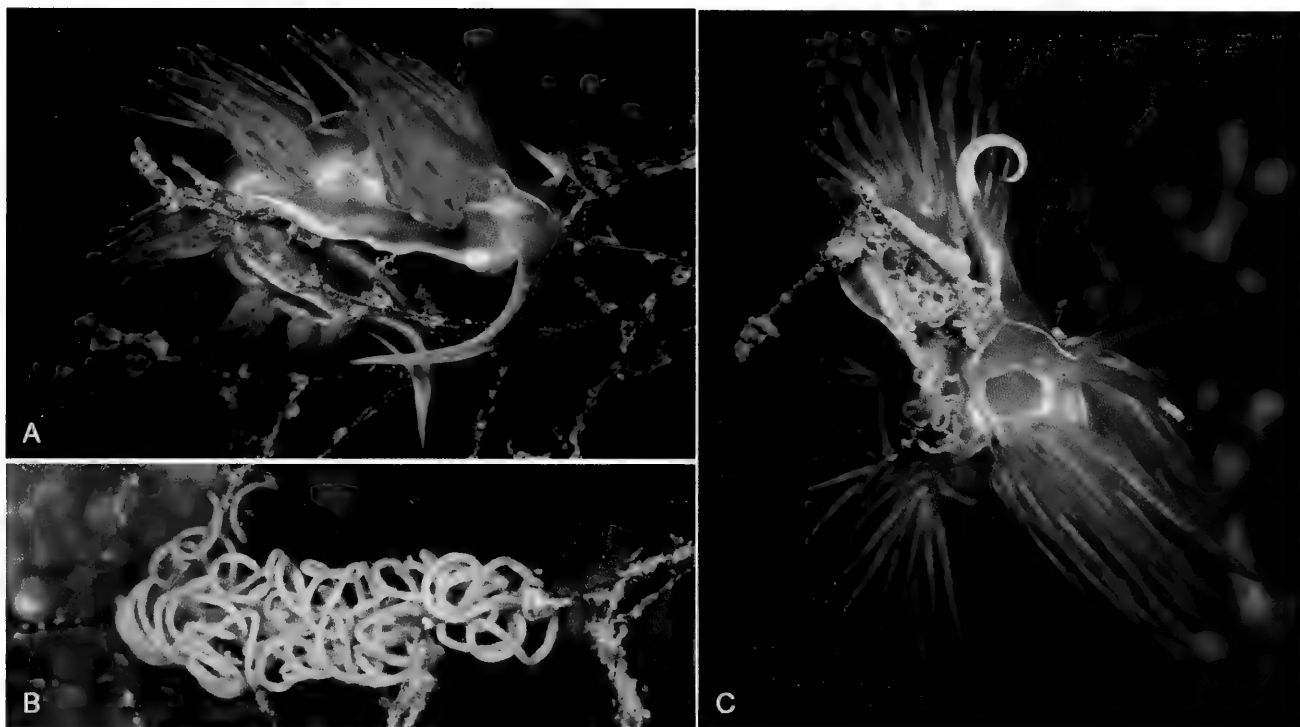
Results

Throughout the years of this study, the highest total average number of individuals of *Dondice banyulensis* was found in Santa Maria La Scala (3.98 individuals/dive), while in Catania and Santa Tecla a lower total number of individuals was observed, 0.41 and 0.04, respectively. Consequently, for these last sites, *D. banyulensis*’s seasonality cannot be assessed, although some observations can be considered for the site of Catania. In Santa Maria La Scala (Fig. 3), from 2017 to 2020, there was an evident increment in the annual average number of specimens. Indeed, between 2017 and 2019, the annual average number of individuals increased from 0.25



**Fig. 3.** Inter-annual variation of the abundance of *D. banyulensis* in the study period in Santa Maria La Scala, Sicily, Italy.

**Fig. 3.** Variazione negli anni dell'abbondanza di *D. banyulensis* nel periodo in esame a Santa Maria La Scala, Sicilia, Italia.



**Fig. 1.** Specimens of *Dondice banyulensis* Portmann & Sandmeier, 1960 and their egg masses in Santa Maria La Scala: **A.** *D. banyulensis* in right lateral view. **B.** *D. banyulensis* egg mass. **C.** *D. banyulensis* during spawning (photos A. Lombardo).

**Fig. 1.** Esemplari di *Dondice banyulensis* Portmann & Sandmeier, 1960 e le loro ovature in Santa Maria La Scala: **A.** *D. banyulensis* in vista laterale destra. **B.** ovature di *D. banyulensis*. **C.** *D. banyulensis* durante la deposizione (foto A. Lombardo).

Canary Islands (Trainito & Doneddu, 2014; Ballesteros et al., 2021). García & García (1984) reported all the habitats and substrates where *D. banyulensis* was found: platform coralligenous assemblages, above branches of *Eunicella singularis* (Esper, 1791) covered with algae, over hydrozoans, bryozoans [*Turbicellepora armata* (Hincks, 1860)] and sedentary annelids (Portmann & Sandmeier, 1960); coralligenous, above hydrozoans (Vicente, 1963; 1964); above *Eudendrium* sp. and *Eunicella* sp. covered with epibionts (Laubier, 1966); amphioxus sands and coralligenous, above *Eudendrium ramosum* (Linnaeus, 1758) (Vicente, 1967); between the surface and coralligenous bottoms, above *E. ramosum*, *Eudendrium racemosum* (Cavolini, 1785), algae, alcyonarians, *Eunicella verrucosa* (Pallas, 1766) (Ros, 1975); detrital-muddy bottoms (Barletta & Melone, 1976); above hydrozoans (Ballesteros, 1980); on leaves of *Posidonia oceanica* (Linnaeus) Delile (Templado, 1982); on muddy substrate above organism-encrusted structures (García, 1982); above hydrozoans near *E. ramosum* (Luque, 1983).

*Dondice banyulensis* feeds principally on hydrozoans of the genus *Eudendrium* Ehrenberg, 1834 and on other nudibranchs as *Flabellina affinis* (Gmelin, 1791), *Cratena peregrina* (Gmelin, 1791) and *Edmundsella pedata* (Montagu, 1816). Furthermore, this species seems also to eat the polyps of gorgonians of the genus *Eunicella* Verrill, 1869 and the bryozoan *Turbicellepora armata* (Ros, 1975; García & García, 1984; Betti, 2011). Generally, *D. banyulensis* is a species that lives in habitats where there is abundant presence of hydrozoans of the genus *Eudendrium* and, thus, also of *Flabellina affinis* and *Cratena peregrina* (all species eaten by *D. banyulensis*) (García &

García, 1984; Betti, 2011). In literature, this species was principally reported in the summer months of July and August (Portmann & Sandmeier, 1960; García & García, 1984; Betti, 2011) and only in a case in October (Portmann & Sandmeier, 1960). Betti (2011) highlighted that this species is extremely rare in the area of Conero also in summer and in presence of favorable environmental conditions.

The aim of this study is to report the presence, seasonality and new behavioral aspects of *D. banyulensis* along the central-eastern coast of Sicily.

## Materials and Methods

This study was conducted from 2017 to 2020 in different sites selected according to different environmental conditions and located along the central-eastern coast of Sicily (Italy) (Fig. 2). Two sites, Ognina (37°31'50.4"N - 15°07'10.8"E) and Bellatrix (37°32'03.2"N - 15°07'35.2"E) are both located in the municipality of Catania and are the most anthropized among the study areas, since they present several apartment buildings, bathing establishments, a harbor and a wastewater outfall. Therefore, due to their proximity (about 540 m) and environmental similarities, Ognina and Bellatrix were considered as a single site listed from now as "Catania". Two other sites, Acque Fredde (37°38'15.7"N - 15°10'52.1"E) and Scalo Pennisi (37°38'23.2"N - 15°11'04.6"E) are both located in the hamlet of Santa Tecla (in the municipality of Acireale) and present the most natural conditions among the study sites. Therefore, due to their proximity

# Seasonality and new observations on *Dondice banyulensis* Portmann & Sandmeier, 1960 (Gastropoda: Nudibranchia) along the central-eastern coast of Sicily

Andrea Lombardo\*(✉) & Giuliana Marletta

Department of Biological,  
Geological and  
Environmental Sciences-  
University of Catania, 95124  
Catania, Italy

\*andylombardo94@gmail.com,  
(✉) corresponding author

## Abstract

The present study explores the seasonality of *Dondice banyulensis* and presents new observations on its behavior. This study was conducted between 2017 and 2020 in different sites along the central-eastern coast of Sicily (Italy). The only site where it was possible to obtain data on seasonality was Santa Maria La Scala, because the species proved present there, all year-round. Through observations made during our research and from the literature, we hypothesize that this nudibranch bases its post-larval life supply on hydrozoans and subsequently, reaching a larger size, it becomes capable of preying upon other nudibranchs. *D. banyulensis* seems thus to be present all year-round in ecosystems rich in hydrozoan colonies of the genus *Eudendrium* and other nudibranch species associated with them, such as *Flabellina affinis* and *Cratena peregrina*.

## Key words

*Dondice banyulensis*, Mediterranean Sea, Nudibranch, seasonality, Sicily.

## Riassunto

[Stagionalità e nuove osservazioni su *Dondice banyulensis* Portmann & Sandmeier, 1960 (Gastropoda: Nudibranchia) lungo la costa centro-orientale della Sicilia.] La presente nota esplora la stagionalità di *Dondice banyulensis* e alcune nuove osservazioni relative al suo comportamento. Questo studio è stato condotto dal 2017 al 2020 in differenti siti localizzati lungo la costa centro-orientale della Sicilia (Italia). L'unico sito in cui è stato possibile ottenere dei dati sulla stagionalità di questo nudibranco è stato Santa Maria La Scala. Infatti, è stato osservato che *D. banyulensis* potrebbe essere potenzialmente presente tutto l'anno in quest'ultima stazione. Inoltre, attraverso osservazioni ottenute tramite la presente ricerca e dalla letteratura, è stato ipotizzato che probabilmente questo nudibranco nella fase post-larvale della sua vita si nutre di idrozoi e successivamente, raggiungendo una taglia maggiore, diventa capace di predare altri nudibranchi. In conclusione, *D. banyulensis* sembra essere una specie presente tutto l'anno in ecosistemi ricchi di colonie di idrozoi del genere *Eudendrium* e di altri nudibranchi associati ad essi, come *Flabellina affinis* e *Cratena peregrina*.

## Parole chiave

*Dondice banyulensis*, Mar Mediterraneo, Nudibranco, stagionalità, Sicilia.

## Introduction

In the Mediterranean Sea, the genus *Dondice* Er. Marcus, 1958 is represented only by two species: *Dondice banyulensis* Portmann & Sandmeier, 1960 and *Dondice trainitoi* Furfaro & Mariottini, 2020 (Furfaro & Mariottini, 2020). These two species are easily distinguishable since there are evident morphological differences, such as the sizes and the chromatic pattern. Indeed, *D. trainitoi* has smaller size, it is characterized by a blue iridescent body and a black epithelium that covers the masticatory jaws. Instead, *D. banyulensis* is the largest aeolidacean of the Mediterranean, having a maximum length of 70 mm (Schmekel & Portmann, 1982; Betti, 2011; Trainito & Doneddu, 2014). This species (Fig. 1. A) presents a transparent-orange body coloring more conspicuous in the anterior part of the body than in the back. Rhinophores, orange-colored, have from 20 to 40 lamellae, which can be complete or incomplete. Cerata are orange-brown and subdivided in six groups on each side of the notum. Their apex is brownish or white opaque

and is rounded by an orange-yellowish ring. The digestive gland's branches, visible for transparency through the cerata's tegument, present a brown coloration that tends to become crimson near the cnidosac. A median white opaque line goes from the oral tentacles' anterior edge to the end of the tail. Moreover, on each side of the body, there is a line with the same color as the median line, which starts from each oral tentacle and ends on the tail, and connects the bases of each group of cerata. Between the central line and the lateral ones, there is another white opaque line that in this case is discontinuous. The edge of the foot is iridescent blue. The jaws, pink red-colored, are visible for transparency through the head's tegument (Schmekel & Portmann, 1982; García & García, 1984). The egg masses (Fig. 1. B, C), from white-pinkish to light orange colored have a rolled-up ribbon shape and are irregularly laid on the substrate (Luque, 1983; García & García, 1984; Betti, 2011).

*Dondice banyulensis* is distributed in the Mediterranean, along the Atlantic coasts of the Iberian Peninsula and in

cles are present. The aperture is narrow and elongated, columella smooth, slightly curved at the beginning of the siphonal canal, the latter being elongated and slightly curved as well.

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## Distribuzione

Sulla base del materiale esaminato, la specie sembra fosse distribuita in ambienti moderatamente profondi della piattaforma continentale con distribuzione cronostatigrafica limitata al Piacenziano. La specie è conosciuta unicamente per Orciano Pisano.

## Osservazioni

Si rimanda a Bouchet & Waren (1980) e ai successivi Tabanelli (1997) e Della Bella & Scarponi (2007), per le considerazioni sul genere *Taranis* Jeffreys, 1870. Per la protoconca di tipo paucispirale, globosa, *Taranis occulta* n. sp. rientra nel gruppo di taxa presenti nell'Atlantico orientale e nel bacino del Mediterraneo, sia fossili che attuali. A questo insieme appartengono la pliocenica *T. circumflexa* (Hornung, 1920) (Tabanelli, 1997 p. 7, tav. 1, fig. 1), la pleistocenica *T. dellabellai* Tabanelli, 1997 (Tabanelli, 1997 p. 7, tav. 1, fig. 2), le pleistoceniche e attuali *T. moerchi* (Malm, 1863) e *T. laevisculpta* Monterosato, 1880 (Bouchet & Waren, 1980 p. 79, figg. 165 e 166), la attuale atlantica *T. borealis* Bouchet & Waren, 1980 (Bouchet & Waren, 1980, p. 79, fig. 162). *Taranis occulta* n. sp. si differenzia da *T. circumflexa* (Hornung, 1920) principalmente per forma più allungata, minor numero di coste assiali, il canale sifonale più allungato, la caratteristica scultura subspinoso, queste particolarità allontanano *Taranis occulta* n. sp. anche dalle altre specie atlanto-mediterranee. Singolare è invece una certa affinità con la specie delle Filippine *Taranis percarinata* (Powell, 1967) (Fig. 4. E), specie vivente a basse profondità, che si differenzia comunque per forma meno allungata, canale sifonale più corto, differente numero e disposizione dei cordoncini spirali.

## Ringraziamenti

Si ringraziano Stefano Dominici (Museo di Storia Naturale di Firenze), Carlo Smriglio (Roma), Michele Quarantelli (Brescia), Cisco Espinar (Lucena, Spagna), Maurizio Forlì (Prato) e Giano Della Bella (Monterenzio,

Bologna) per suggerimenti e discussioni utili alla stesura di questo lavoro.

## Appendice

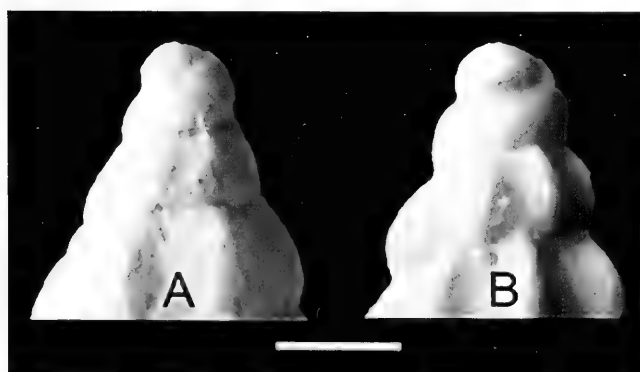
English descriptions:

*Acirsa ambrosii* n. sp. - Medium sized robust shell (maximum height = 29 mm). Strongly tapered spire, composed of twelve weakly rounded whorls with a slightly oblique and shallow suture. Protoconch missing in the studied specimens. Axial sculpture composed of 11-12 strong ribs, more developed abapically, narrower than the interspaces, slightly opisthocline, subcontinuous. Spiral sculpture composed of thin cords of irregular thickness, barely visible at the base of each whorl, 4-5 on the second last whorl, about 20 at the base of the last whorl where they become more visible. Roundish aperture with very robust external lip grown from a varix. Columellar callus regularly arched.

*Haedropleura dellabellai* n. sp. - Shell small (maximum height 8.7 mm), elongate-fusiform, glossy, whitish. Protoconch entirely smooth, peg-like, paucispiral (of 1.3-1.5 whorls), with a papillose tip and a weakly convex, almost straight remaining half-whorl. Transition to teleoconch marked by a narrow sigmoid fold. Teleoconch glossy, of maximum 5.2 whorls, with a high, conical spire; whorl sides regularly convex over the abapical whorl, slightly concave in the remaining portion. Suture moderately deep, slightly undulated by rib-terminations. Aperture oblong with a small parietal callus. Columellar lip straight, thin. Outer lip, thin, backed by a moderate varix. Anal sinus shallow but broad. Siphonal canal short, wide, without notch. Last whorl moderately to well rounded. Axial sculpture consists of 9-10 narrow, rounded, opisthocline ribs along with well-marked growth lines. Axial ribs on spire slightly curved, extending from suture to suture, subdued and pinched adapically, prominent on the lower half of whorls; on the last whorl, ribs low to obsolete, fading out at mid-whorl. Spiral sculpture consists of dense, close-set threads, wider on neck than higher up.

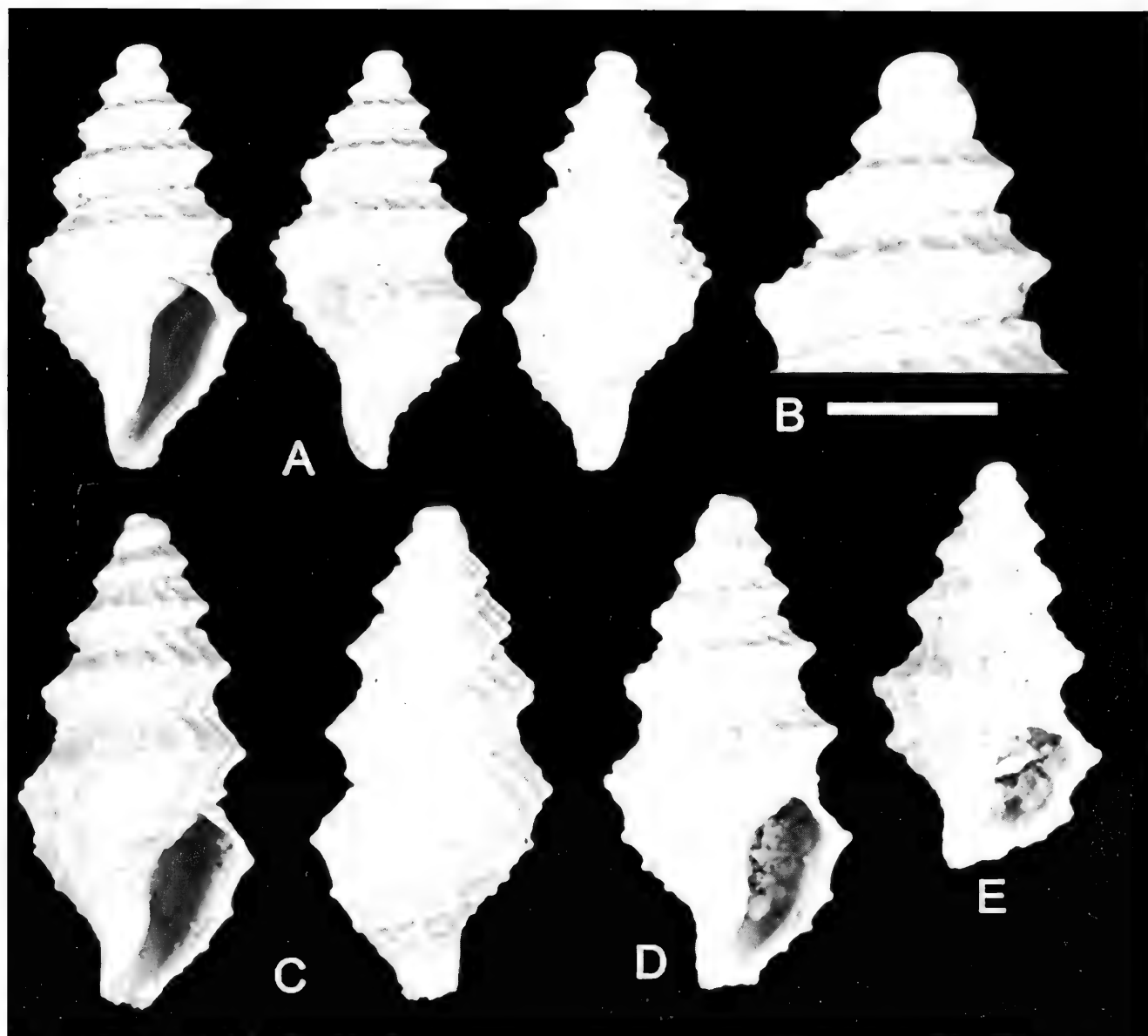
*Taranis occulta* n. sp. - Small sized shell (maximum height = 3.8 mm) with elongated spire and highly concave whorls. Protoconch paucispiral, globose, of about one whorl. Teleoconch of about 4.5 whorls. Strong axial thin ribs, slightly prosocline and spaced by large interspaces present on all whorls. On the last whorl, roughly fifteen such ribs are present. Until the second last whorl, the spiral sculpture consists of three spiral cords, two of them being very close to the suture and thus partially overlapping it, while the third one is placed in the middle part of the whorl, where it forms an acute and robust keel.

On the last whorl, which accounts for roughly half of the whole shell height, five spiral cords are present. Over the entire shell surface, wherever the spiral cords and the axial ribs intersect with, slightly thorny tuber-



**Fig. 5.** Giri apicali di *Haedropleura* spp. **A.** *Haedropleura secalina* (Philippi, 1844), Poggio alla staffa (Siena), Zancleano. **B.** *Haedropleura dellabellai* n. sp. Orciano Pisano, Piacenziano. Scala = 2 mm.

**Fig. 5.** Apical whorls of *Haedropleura* spp. **A.** *Haedropleura secalina* (Philippi, 1844), Poggio alla staffa (Siena), Zanclean. **B.** *Haedropleura dellabellai* n. sp. Orciano Pisano, Piacenzian. Scale bar = 2 mm.



**Fig. 4. A-D.** *Taranis occulta* n. sp. **A.** Olotipo, Orciano Pisano, Piacenziano, H = 3 mm (MSNF IGF 104716). **B.** Olotipo, particolare giri apicali (scala = 1 mm). **C.** Paratipo 1, Orciano Pisano, Piacenziano, H = 3,8 mm (MSNF IGF 104717). **D.** Paratipo 2, Orciano Pisano, Piacenziano, H = 3,8 mm (MSNF IGF 104718). **E.** *Taranis percarinata* (Powell, 1967), Olotipo, Nakoda Bay, Filippine, Recente, H = 2,7 mm (USNM281739F).

**Fig. 4. A-D.** *Taranis occulta* n. sp. **A.** Holotype, Orciano Pisano, Piacenzian, H = 3 mm ((MSNF IGF 104716). **B.** Holotype, apical whorls (scale bar = 1 mm). **C.** Paratype 1, Orciano Pisano, Piacenzian, H = 3.8 mm (MSNF IGF 104717). **D.** Paratype 2, Orciano Pisano, Piacenzian, H = 3.8 mm (MSNF IGF 104718). **E.** *Taranis percarinata* (Powell, 1967), Holotype, Nakoda Bay, Philippines, Recent, H = 2.7 mm (USNM281739F).

## Altro materiale esaminato

Orciano Pisano (Pisa), Piacenziano, 27 es. (CMC).

## Località tipo

Orciano Pisano (Pisa), località Pieve Vecchia, Piacenziano, Dominici et al. (2017), 43°29'57"N, 10°29'15"E.

## Origine del nome

Occulta, nascosta, perché fino ad oggi sconosciuta.

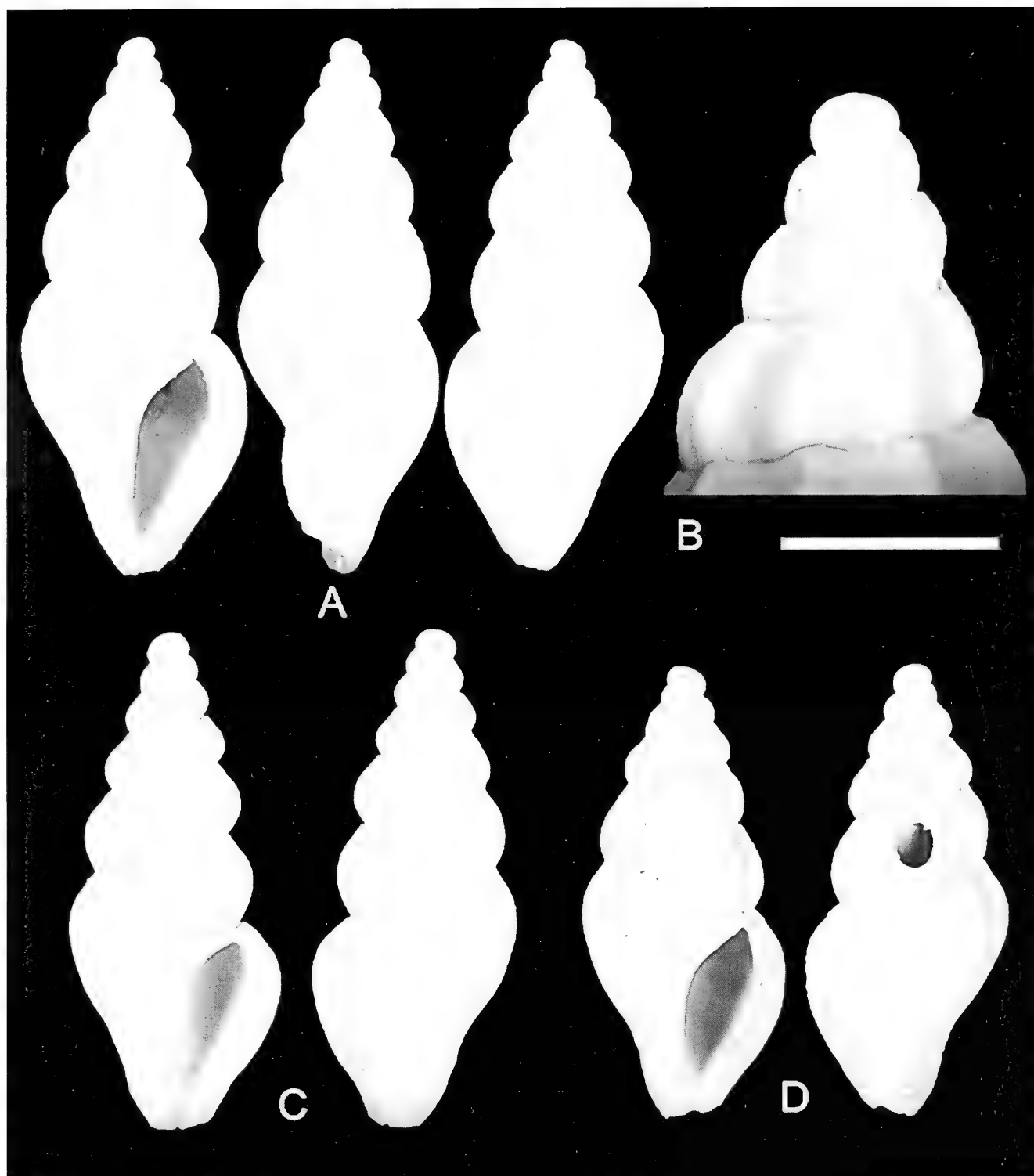
## Descrizione

Conchiglia di piccole dimensioni (H massima = 3,8 mm) con spira allungata e con anfratti fortemente con-

cavi. Protoconca paucispirale, globosa, di circa un giro. La teleoconca è costituita da 4,5 giri.

Su tuttigli anfratti si nota una robusta scultura costituita da coste assiali filiformi, prosocline, separate da ampi interspazi. Sull'ultimo giro se ne contano una quindicina. Scultura spirale costituita sino al penultimo giro da tre cingoletti di cui due posti presso le suture del giro, ricoprendole in parte e uno nella parte centrale del giro, dove forma una acuta e robusta carena. Nell'ultimo giro, che occupa circa la metà dell'altezza dell'intera conchiglia, sono presenti cinque cingoletti spirali. Su tutta la conchiglia l'incrociarsi di coste assiali e cingoletti spirali produce delle protuberanze subspinose. Apertura stretta, allungata. Columella liscia, leggermente ricurva all'entrata del canale sifonale; quest'ultimo si presenta allungato ed anch'esso leggermente ricurvo.





**Fig. 3.** *Haedroleura dellabellai* n. sp. **A.** Olotipo, Orciano Pisano, Piacenziano, H = 8 mm (MSNF IGF 104713). **B.** Olotipo, particolare giri apicali (scala = 2 mm). **C.** Paratipo 1, Orciano Pisano, Piacenziano, H = 7 mm (MSNF IGF 104714). **D.** Paratipo 2, Orciano Pisano, Piacenziano, H = 6,5 mm (MSNF IGF 104715).

**Fig. 3.** *Haedroleura dellabellai* n. sp. **A.** Holotype, Orciano Pisano, Piacenzian, H = 8 mm (MSNF IGF 104713). **B.** Holotype, apical whorls (scale bar = 2 mm). **C.** Paratype 1, Orciano Pisano, Piacenzian, H = 7 mm (MSNF IGF 104714). **D.** Paratype 2, Orciano Pisano, Piacenzian, H = 6-5 mm (MSNF IGF 104715).

Famiglia Raphitomidae Bellardi, 1875  
Genere *Taranis* Jeffreys, 1870

Specie tipo *Taranis moerchii* (Malm, 1861)

*Taranis occulta* n. sp.  
(Fig. 4. A-D)

*Taranis* sp. - Brunetti M. & Cresti, 2018, p. 92, fig. 375.

#### Materiale tipo

Olotipo, H = 3 mm (MSNF IGF 104716); Paratipo 1, H = 3,8 mm (MSNF IGF 104717); Paratipo 2, H = 3,8 mm (MSNF IGF 104718).

## Osservazioni

*Acirsa ambrosii* n. sp. presenta qualche affinità con alcune specie mioceniche, tra cui *Acirsa (Hemiacirsa) duvergieri* (De Boury in Cossmann, 1912) (Cossmann 1912, tav. 4, figg. 123-124) del Miocene inferiore francese, che si distingue dalla nuova specie per le dimensioni decisamente inferiori (10,6 mm), la sutura più incisa, il maggior numero di coste assiali, la scultura spirale più prominente, i giri meno convessi. Anche quella figurata da Janssen (1984, p. 162, tav. 50, fig. 1) come *Acirsa (Hemiacirsa)* aff. *duvergieri* (De Boury in Cossmann, 1912) del Miocene medio olandese, presenta differenze importanti rispetto alla nuova specie: dimensioni inferiori, guscio più sottile, scultura spirale obsoleta e minore numero di coste assiali. Tra le specie del Miocene italiano, *Hemiacirsa prolanceolata* Sacco, 1891 (Ferrero Mortara et al., 1984, tav. 6 fig. 15) della Collina di Torino, presenta forma della spira affine, ma scultura assiale con coste sottili, affilate e in minor numero. *Acirsa lanceolata* (Brocchi, 1814) (Fig. 2. E) (Cavallo & Repetto, 1992, p. 81, fig. 162; Sosso & Dell'Angelo, 2010, p. 37) è l'unica specie pliocenica che può ricordare *Acirsa ambrosii* n. sp., presentando comunque, oltre ad una diversa scultura spirale e assiale, il profilo dei giri differente, completamente piano. Ancora più importanti le differenze con *Acirsa meneghiniana* (Cocconi, 1873) (Fig. 2. F), taxon rappresentato fino ad ora unicamente dal solo olotipo e ben diverso da *Acirsa ambrosii* n. sp. per la forma generale, per le coste assiali, per la striatura spirale, per l'apertura meno varicosa e soprattutto per la forma dei giri, quasi carenati (Cocconi, 1873, p. 128, tav. 3, figg. 17-18).

Superfamiglia Conoidea J. Fleming, 1822

Famiglia Horaiclavidae Bouchet, Kantor, Sysoev & Puillandre, 2011

Genere *Haedropleura* Bucquoy, Dautzenberg & Dollfus, 1883

Specie tipo *Haedropleura septangularis* (Montagu, 1803)

### ***Haedropleura dellabellai* n. sp.** (Figg. 3. A-D, 4. B)

*Haedropleura* sp. 1 - Scarponi et al. 2011, p. 47, figg. 37-42, 70-72.  
*Haedropleura* sp. - Brunetti M. & Cresti, 2018, p. 88, fig. 355.

## Materiale tipo

Olotipo, H = 8 mm (MSNF IGF 104713); Paratipo 1, H = 7 mm (MSNF IGF 104714); Paratipo 2, H = 6,5 mm (MSNF IGF 104715).

## Altro materiale esaminato

Orciano Pisano (Pisa), Piacenziano, 32 es. (CMC); 24 es (CMB); 10 es. (CDB).

## Località tipo

Orciano Pisano (Pisa), località Pieve Vecchia, Piacenziano, Dominici et al. (2017), 43°29'57"N, 10°29'15"E.

## Origine del nome

La specie è dedicata all'amico, malacologo e maestro di vita, Giano Della Bella, che, insieme a Daniele Scarponi e Alessandro Ceregato ha riconosciuto per la prima volta questa specie come nuova, ma non l'ha formalmente descritta.

## Descrizione

Conchiglia piccola (H massima = 8,7 mm), allungato-fusiforme, lucida, biancastra. Protoconca interamente liscia, a forma di chiodo, paucispirale (di 1,3-1,5 giri), con punta papillosa e semigiro rimanente debolmente convesso, quasi diritto. Transizione alla teleoconca contrassegnata da una piega sigmoidea stretta. Teleoconca lucida, di max. 5,2 giri, conici; spira regolarmente convessa nella parte abapicale, leggermente concava nella parte rimanente. Sutura moderatamente profonda, leggermente ondulata dalle terminazioni delle coste assiali. Apertura oblunga con piccolo callo parietale. Labbro columellare diritto, sottile. Labbro esterno, sottile, con una varice moderata. Seno anale superficiale ma ampio. Canale sifonale corto, largo. Ultimo giro moderatamente arrotondato. La scultura assiale è costituita da 9-10 costole opistocline strette, arrotondate e da linee di crescita ben marcate. Costole assiali superiormente leggermente curve, che proseguono da sutura a sutura, prominenti sulla metà inferiore dei giri; sull'ultimo giro le coste sono obsolete nella parte inferiore e svaniscono a metà del giro. La scultura spirale è costituita da filetti sottili e ravvicinati, più larghi sul collo che più in alto.

## Distribuzione

Sulla base del materiale esaminato, la specie sembra fosse distribuita in ambienti moderatamente profondi della piattaforma, con distribuzione cronostatigrafica limitata al Piacenziano. La specie è conosciuta unicamente per Orciano Pisano.

## Osservazioni

*Haedropleura dellabellai* n. sp. è stata in precedenza figurata e descritta da Scarponi et al. (2011) come *Haedropleura* sp. 1 e successivamente figurata da Brunetti M. & Cresti, 2018 come *Haedropleura* sp. Il taxon non era stato istituito in precedenza a causa del numero ridotto di esemplari rinvenuti in buone condizioni. Nuove raccolte di materiale in migliori condizioni, hanno permesso di istituire la nuova specie, mostrando una sostanziale costanza dei caratteri morfologici. Per il tipo e la forma della protoconca *H. dellabellai* n. sp. presenta una certa somiglianza con *H. secalina* (Philippi, 1844) (Scarponi & Della Bella, 2004, p. 55, figg. 84a-b, 91 e Scarponi et al. 2011 p. 43 figg. 7-12, 55-60) entrambe le specie presentano una protoconca di tipo paucispirale papilliforme, ma, di dimensioni differenti (Fig. 5. A, B); diversa anche la conformazione delle coste assiali subnodose nella specie di Philippi, acute e leggermente falciformi nella nuova specie.

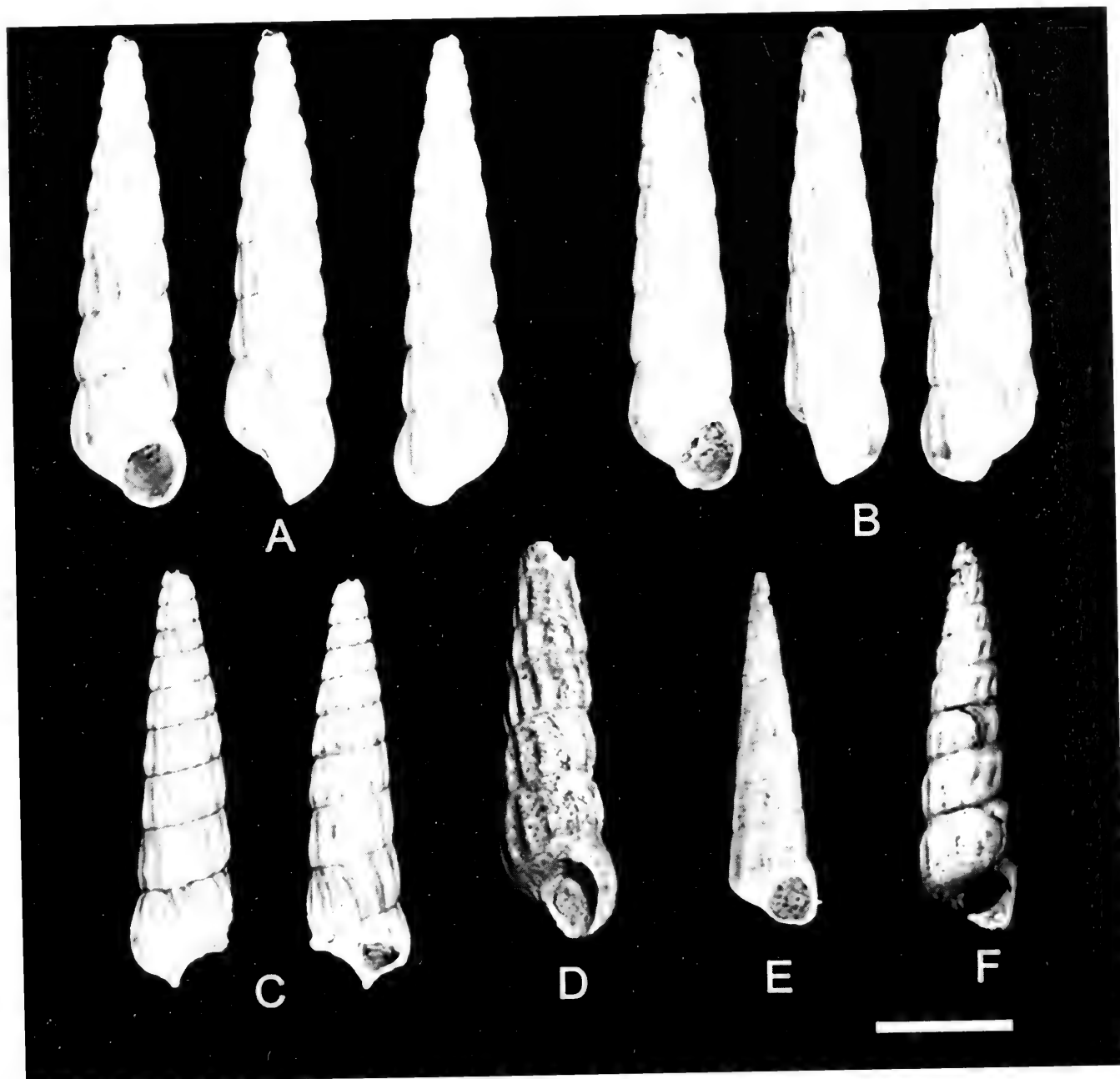
## Descrizione

Conchiglia di medie dimensioni (H massima = 29 mm), con guscio robusto. Spira di forma estremamente affusolata, formata da una dozzina di giri debolmente arrotondati con sutura leggermente inclinata poco profonda. Protoconca sconosciuta. Scultura assiale composta da 11-12 coste robuste, più sviluppate abapicalmente, più strette degli interspazi, leggermente opistocline, subcontinue. Scultura spirale composta da filetti di spessore irregolare, poco visibili alla base di ogni giro, 4-5 nel penultimo, una ventina alla base dell'ultimo giro dove sono più visibili. Apertura su-

brotonda, con labbro esterno molto robusto, formato da una varice. Callo columellare regolarmente arcuato.

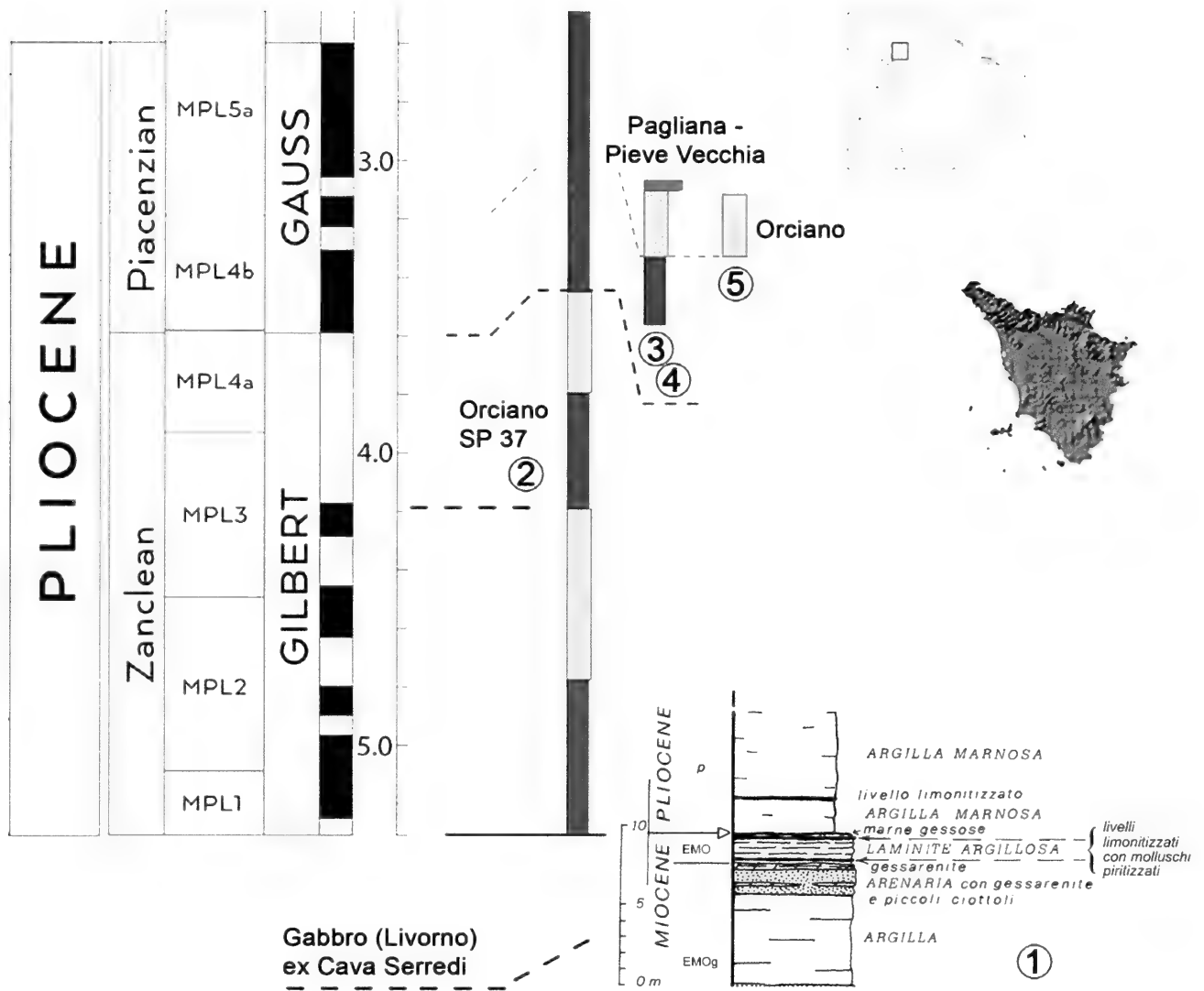
## Distribuzione

Sulla base del materiale esaminato e la fauna associata, con presenza tra le altre di *Ficus ficoides* (Brocchi, 1814) e *Turriscula torulosa* (Brocchi, 1814), la specie sembra fosse distribuita in ambienti moderatamente profondi della piattaforma continentale, con distribuzione cronostatigrafica limitata allo Zancleano. La specie è conosciuta unicamente per Orciano Pisano.



**Fig. 2. A-D.** *Acirsa ambrosii* n. sp. **A.** Olotipo, Orciano Pisano, Zancleano, H = 29 mm (MSNF IGF 104710). **B.** Paratipo 1, Orciano Pisano, Zancleano, H = 28,5 mm (MSNF IGF 104711). **C.** Paratipo 2, Orciano Pisano, Piacenziano, H = 22 mm (MSNF IGF 104711). **D.** Orciano Pisano, Zancleano, H = 24 mm (CMB). **E.** *Acirsa lanceolata* (Brocchi, 1814), Ciuciano (Siena), Zancleano, H = 21 mm (CMC). **F.** *Acirsa meneghiniana* (Cocconi, 1873), Olotipo, Variatico (Parma), Pliocene, H = 25 mm (MPP Coll. Cocconi). Scala = 5 mm.

**Fig. 2. A-D.** *Acirsa ambrosii* n. sp. **A.** Holotype, Orciano Pisano, Zanclean, H = 29 mm (MSNF IGF 104710). **B.** Paratype 1, Orciano Pisano, Zanclean, H = 28.5 mm (MSNF IGF 104711). **C.** Paratype 2, Orciano Pisano, Zanclean, H = 22 mm (MSNF IGF 104712). **D.** Orciano Pisano, Zanclean, H = 24 mm (CMB). **E.** *Acirsa lanceolata* (Brocchi, 1814), Ciuciano (Siena), Zancleano, H = 21 mm (CMC). **F.** *Acirsa meneghiniana* (Cocconi, 1873), Holotype, Variatico (Parma), Pliocene, H = 25 mm (MPP Coll. Cocconi). Scale bar = 5 mm



**Fig. 1.** Assetto geologico e localizzazione geografica dei giacimenti trattati nel testo: **1.** Sezione stratigrafica al passaggio Messiniano-Zancleano (Bossio et al., 1981) Donati Laterizi, ex cava Serredi, Gabbro (Livorno), 43°29'05.5"N 10°27'22.9"E; **2.** Località S.P. 37, Zancleano, Orciano Pisano (Pisa), 43°30'8"N, 10°28'26"E; **3-4.** Località Pieve Vecchia, Piacenziano, Orciano Pisano (Pisa), 43°29'57"N, 10°29'15"E. **5.** Orciano Pisano di Dominici et al. (2017).

**Fig. 1.** Stratigraphic log and geographical position of the outcrops reported in the text: **1.** Messinian-Zanclean transition (Bossio et al., 1981), stratigraphic section from Donati Laterizi, ex cava Serredi, Gabbro (Livorno), 43°29'05.5"N 10°27'22.9"E; **2.** Locality S.P. 37, Zanclean, Orciano Pisano (Pisa), 43°30'8"N, 10°28'26"E; **3-4.** Locality Pieve Vecchia, Piacenzian, Orciano Pisano (Pisa), 43°29'57"N, 10°29'15"E. **5.** Orciano Pisano by Dominici et al. (2017).

tional Museum of Natural History; MPP = Museo Paleontologico Parmense; CMC = collezione M. Cresti; CMB = collezione M. Brunetti; CDB = collezione G. Della Bella; es. = esemplare.

### Sistematica

Classe Gastropoda Cuvier, 1795  
Sottoclasse Caenogastropoda Cox, 1960  
Superfamiglia Epitonioidea Berry, 1910  
Famiglia Epitoniidae Berry, 1910  
Genere *Acirsa* Mörch, 1857

Specie tipo *Acirsa borealis* (Lyell, 1841)

*Acirsa ambrosii* n. sp.  
(Fig. 2. A-D)

### Materiale tipo

Olotipo, H = 29 mm (MSNF IGF 104710); Paratipo 1, H = 28,5 mm (MSNF IGF 104711); Paratipo 2, H = 22 mm (MSNF IGF 104712).

### Altro materiale esaminato

Orciano Pisano (Pisa), Zancleano, 1 es (CMB).

### Località tipo

Orciano Pisano (Pisa), località S.P. 37, Zancleano, 43°30'8"N, 10°28'26"E.

### Origine del nome

La specie è dedicata a Ildebrando Ambrosi (1850-1915) paleontologo esperto in malacologia fossile.

# Tre nuove specie di Gasteropodi per il Pliocene di Orciano Pisano

M. Mauro Brunetti\* (✉) & Massimo Cresti<sup>#</sup>

\* Calle Navas 106, 14511  
Navas del Selpillar,  
Spagna,  
mbrunetti45@gmail.com,  
(✉) corresponding author

<sup>#</sup> Via Argiano 8 50026 San  
Casciano in Val di Pesa  
(Firenze), Italia,  
xcrema@inwind.it

## Riassunto

Viene segnalato il rinvenimento in sedimenti pertinenti al Pliocene della Toscana centrale, di vari esemplari riferibili a tre specie ritenute nuove: *Acirsa ambrosii* n. sp., *Haedropleura dellabellai* n. sp. e *Taranis occulta* n. sp.

## Parole chiave

Epitoniidae, Horaiclavidae, Raphitomidae, Pliocene, Italia, tassonomia.

## Abstract

We here report the discovery of several specimens belonging to three new species here described, *Acirsa ambrosii* n. sp., *Haedropleura dellabellai* n. sp. and *Taranis occulta* n. sp., from Pliocene sediments of central Tuscany.

## Key words

Eulimidae, Horaiclavidae, Raphitomidae, Pliocene, Italy, taxonomy.

## Introduzione

Lo studio e l'esame di numeroso materiale fossile pliocenico proveniente da Orciano Pisano (Pisa) utilizzato per la preparazione di una pubblicazione (Brunetti M. & Cresti, 2018) e di un suo successivo aggiornamento (Brunetti M & Cresti in prep.), oltre all'acquisizione di una vecchia collezione (coll. Ambrosi) con materiale di Orciano Pisano, che rischiava di essere dispersa, ha portato alla scoperta di tre nuove specie: *Acirsa ambrosii* n. sp., *Haedropleura dellabellai* n. sp. e *Taranis occulta* n. sp., tutte esclusive del Pliocene di Orciano Pisano, qui descritte.

## Assetto geologico

I terreni nei dintorni dell'abitato di Orciano Pisano, sono costituiti prevalentemente da argille più o meno sabbiose accompagnate talvolta, verso la parte superiore dei rilievi collinari, da rare calcareniti. L'età dei sedimenti varia tra il Pliocene inferiore e la fine del Piacenziano (Danise et al., 2010; Dominici et al., 2017). Nelle "argille" si possono distinguere delle differenze di sedimentazione e facies, evidenziate anche da un diverso contenuto delle faune a molluschi, che possono corrispondere a diverse età all'interno del Pliocene. Le tipiche argille azzurre del Pliocene inferiore, da cui proviene la *Acirsa ambrosii* n. sp., di ambiente batiale, sono maggiormente presenti pochi chilometri più ad Ovest, fin nei pressi della località Gabbro, dove sono in contatto diretto, e continuo, con i sedimenti del Miocene superiore (Bossio et. al., 1981). Il restante materiale proviene da sedimenti di argille sabbiose, generalmente depositati ad una profondità tra l'infra-litorale profondo e il

circolitorale, di età medio Piacenziana, come risulta in Dominici et al., 2017 (Fig. 1). In particolare il punto 1, con la stratigrafia esistente nella cava di argilla per laterizi, ex Serredi (Bossio et al., 1981), mostra il passaggio tra il Messiniano superiore ed il Pliocene inferiore, avvenuto con sedimentazione mare su mare, con livelli più o meno profondi di argille, contenenti talvolta resti di molluschi piritizzati (Ciampalini et al., 2014), il n° 2, corrispondente al punto di ritrovamento di *Acirsa ambrosii* n. sp., è attribuito allo Zancleano in base ad alcuni molluschi accompagnatori della nuova specie, quali ad esempio *Ficus ficoides* (Brocchi, 1814) e *Turriscula torulosa* (Brocchi, 1814), ed alla contemporanea posizione stratigrafica inferiore rispetto ai superiori livelli 3-5 attribuiti al Piacenziano (Dominici et al., 2017).

## Materiali e metodi

Il materiale esaminato proviene sia da raccolte manuali, sia da campionamenti di sedimento trattato con acqua ossigenata a 135 volumi diluita al 15 % e successivamente vagliato con setaccio a maglie fini (0,3 mm). Il residuo, lavato e fatto asciugare, è poi stato esaminato al microscopio binoculare per estrarne i campioni utilizzati per questo studio. Per le determinazioni suprageneriche ci si è attenuti al World Register of Marine Species, (WoRMS, <http://www.marinespecies.org/>; last access March 2021). Sono usate le seguenti abbreviazioni: H = altezza massima della conchiglia, misurata dall'apice sino all'estremità anteriore del canale sifonale; MSNF = Museo di Storia Naturale di Firenze; IGF = Istituto di Geologia di Firenze per attribuzione del numero di catalogo per MSNF; USNM = Smithsonian Na-

Conclusion

The review of *Eulimella compactilis* name usage by various Authors and their nomenclatural acts led to conclusion that its synonymy with *Eulimella acicula* shall be rejected and that van Aartsen’s (1994) opinion shall be followed for the interpretation of this species. Høisaeter (2014) incorrectly assigned this name to a species different from the one fixed by Aartsen (1994), and for this the new name *E. hoeisaeteri* is here proposed. Additionally, it is reported that *Eulimella hoeisaeteri* is living in deep waters of Tuscan Archipelago and other Mediterranean localities.

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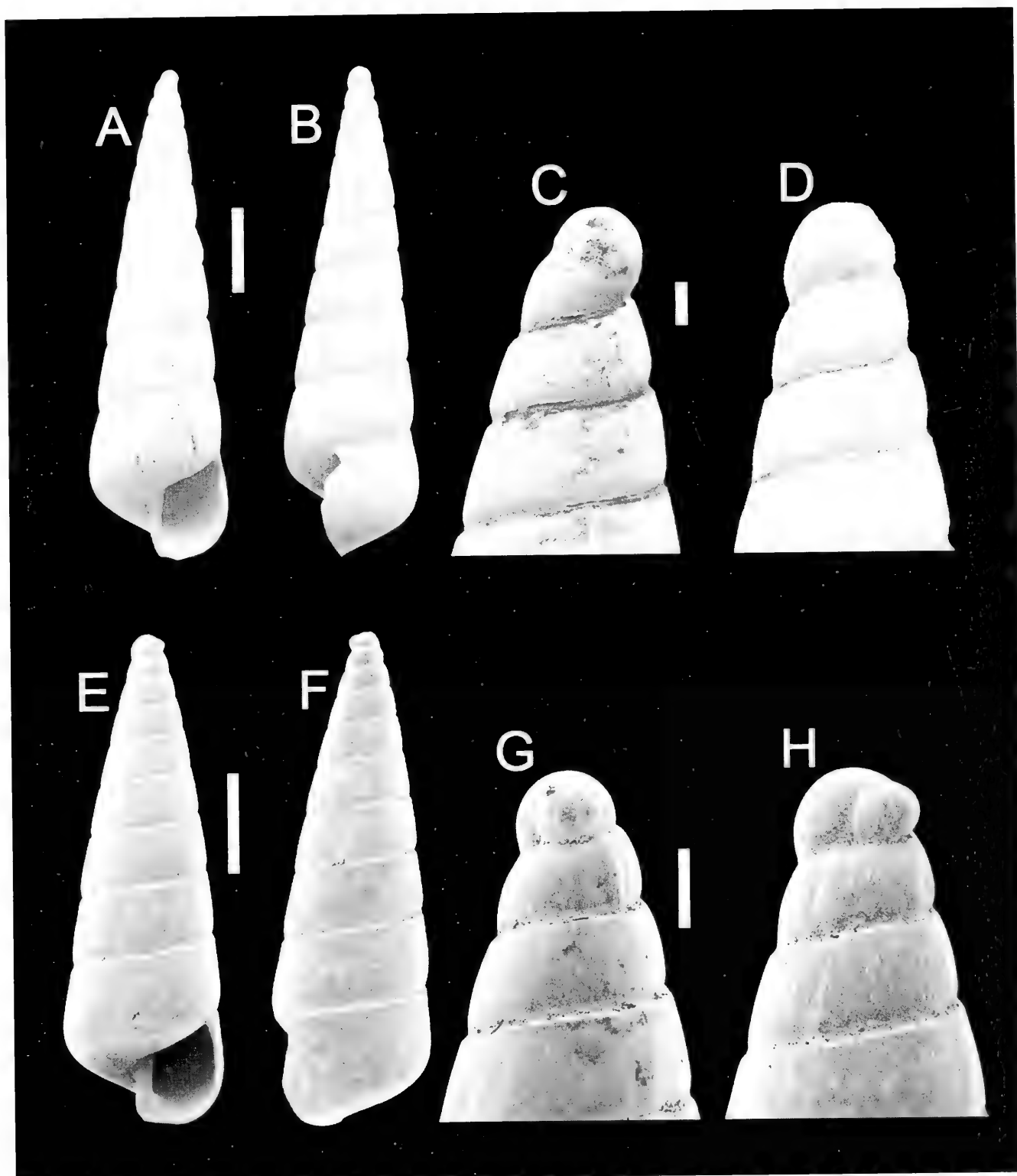
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*Eulimella hoeisaeteri* n. sp. and its occurrence in the Mediterranean Sea (Mollusca: Pyramidellidae)





**Fig 1. A-D.** *Eulimella hoeisaeteri* n. sp., between Capraia island and Capo Corso (South Ligurian sea), - 500 m. MZB60402. **1. E-H.** *Eulimella scillae*, same locality. Scale bar. Figs 1A, 1B, 1E, 1F: 1 mm; Figs 1C, D: 110  $\mu$ m; Figs 1G, 1H: 210  $\mu$ m.

**Fig 1. A-D.** *Eulimella hoeisaeteri* n. sp., tra Capraia e Capo Corso (mar Ligure meridionale), - 500 m. MZB60402. **1. E-H.** *Eulimella scillae*, stessa località. Segmento di scala. Figg. 1A, 1B, 1E, 1F: 1 mm; Figg. 1C, D: 110  $\mu$ m; Figg. 1G, 1H: 210  $\mu$ m.

at a height of 4.6 mm, against about 5.7 mm), higher initial teleoconch whorls, much less oblique suture and straight instead of flexuous growth lines.

*Eulimella superflua* (Monterosato, 1875) is a doubtful species, discussed by Ardovini & Micali (2009). The species is based on material from off Palermo in 210 m, described as "Simile alla precedente [*E. scillae*], ma la sua base è convessa invece di angolata ed ha una più

snella ed elegante forma [Similar to the previous species [*E. scillae*], with convex instead of angulate base and a more slender and pretty form]". As there is no mention about much smaller dimensions, I exclude the possibility that it may be identical to the new species. Anyway Appolloni et al. (2018) found that in the Monterosato's collection there is a box with label, but type material is missing and shall be considered lost.

## Type Locality

Lofoten Islands (north-west Norway).

## Discussion

This species, characterized by a protoconch coiled at 90° (Type A-II) differs from *E. acicula* (Philippi, 1836), for the much stouter profile and larger protoconch (compare fig. 15 vs. 18 in Aartsen (1994), that have similar scale bar). Unfortunately, protoconch diameter cannot be properly measured from the photos.

For the above indicated reasons, the following comparison is done against the photo of *E. compactilis* in Warén (1980) instead of the one in van Aartsen (1994). *Eulimella ventricosa* (Forbes, 1844) is a very variable species, that is always narrower and may also be easily separated from *E. compactilis* for the type B protoconch. *Eulimella ataktos* Warén, 1991 has a similar outline, and may be separated from *E. compactilis* for the type B protoconch. *Eulimella bogii* Aartsen, 1994 and *E. cossignaniorum* Aartsen, 1994 may be easily separated from *E. compactilis* because of the type B protoconch and less inflate whorls. *Eulimella scillae* is much larger (almost the double), showing a conical outline with flat whorls and slightly flexuous growth lines. *Eulimella hoeisaeteri* shows a type B protoconch, conical outline with almost flat whorls and slightly flexuous growth lines.

Among the recent species from West Africa, *E. zornikulla* Schander, 1994 and *E. laevidens* Peñas & Rolán, 1997 show some resemblance for what concern the type of protoconch, but teleoconch is remarkably different. *Eulimella angeli* Peñas & Rolán, 1997 differs for the lower whorls, much less oblique suture and flatter apical whorls; *E. paucisulcata* Peñas & Rolán, 1997 differs for the stouter outline, flatter whorls and angulate periphery.

### *Eulimella hoeisaeteri* n. sp.

2014 *Eulimella compactilis* - Hoeisaeter, p. 57, fig. 97 (ZMBN 82890).

Description in Høisaeter (2014) “*Eulimella* with fairly elongate, slightly cyrtconoid shell. Apical angle 19° or less. Total shell length not exceeding 5 mm. Number of whorls eight or less. Shell delicate, thin, transparent, smooth with fine sinuous growth lines. Whorls evenly rounded or somewhat flattened. Body whorl evenly rounded below. Aperture higher than broad, flaring out below. Columellar fold not distinguishable. Protoconch large for genus (diameter about 320 µm), planorboid, only slightly inclined (angle of inclination about 90°). First postnuclear whorl around 180 µm high. **Soft parts:** Not known. **Operculum:** Not known”.

## Type material

The holotype is the specimen from Fanafjord, legit Warén, preserved at ZMBN with number (ZMBN 82890), figured by Høisaeter (2014, fig. 97).

## Additional material

One specimen (Fig. 1. A-D) dredged in 2019 between Capraia island and Capo Corso (South Ligurian sea), 500 m, mud, deposited at Museo di Zoologia dell'Università di Bologna (MZB n° MZB60402), over 50 sh. (PMF, FGL) from same area; 2 sh. (PMF), off Capo Vaticano (near Tropea, south Tyrrhenian sea), dredged around 1988, 200m, mud; 2 sh. (PMF). Central Adriatic sea, dredged around 1992, 90 m, mud; 5 sh. (PMF), Banco S. Lucia, dredged in 2019, 500 m. (South Ligurian sea).

## Type Locality

Fanafjord, Norway (60°13.5'N, 05°14.3'E), 185-200 m silt w/gravel.

## Discussion

Høisaeter (2014) figured a 4.3-mm-high specimen from Fanafjord, preserved at ZMBN with number 82890 (fig. 97) and three specimens from Sars collection (fig. 98), commenting “Warén (1991) claims that the specimens determined by G.O. Sars in the Natural History Museum, University of Oslo, are juveniles of *E. scillae*. After having compared my material with one of the (18) syntypes of G.O. Sars’ (Figure 98 left) I am convinced that it is a good species, distinguished among other things, from *E. scillae* by its protoconch (cf. Figures 97 and 99). Figure 98 shows specimens from respectively Lofoten (68°N), Fanafjorden (60°13'N) and the Norwegian Trench (61°30'N)”.

Høisaeter (2014) stated that is “distinguished among other things, from *E. scillae* by its protoconch”, that really has a less protruding outline. The protoconch diameter of studied Mediterranean specimens is about 280 µm, a little less than the value of 320 µm indicated by Høisaeter. This species (Fig. 1. A-D) differs from *E. scillae* (Fig. 1. E-H) for the smaller size (maximum height about 6 mm, against 10 mm), the protoconch shape, a thinner shell, a more slender outline (spire angle about 20° against 30°), less angulate periphery and narrower aperture. The best-preserved examined specimen shows a very fine spiral striation, as in *E. scillae*.

The specimen of *E. scillae* figured by Warén (1991, Fig. 37A) possibly belongs to this species, having a type A1 protoconch, inclined of about 110°, instead of type A2 protoconch, slightly inflated whorls and rounded periphery.

*Eulimella bogii* Aartsen, 1994 and *E. cossignaniorum* Aartsen, 1994 differ for the type B protoconch, narrower outline, less angulate periphery, growth lines straight instead of sinuous.

*Eulimella frielei* Høisaeter, 2014, based on specimens from Norway, shows a “pear shaped” whorl profile, a very characteristic feature, not present in *E. hoeisaeteri*. Among the recent species from West Africa, only *E. coysmani* Peñas et al., 2014 shows a good resemblance, but differs for the slower size increase (about 9 whorls

the Hebrides (USNM 132718) “is a typical *Eulimella laevis*, but there is also a specimen from G.O. Sars, Lofoten, Norway, which may be separated from *E. scillae* by its total lack of spiral sculpture”. This specimen (USNM 132573) was figured by Warén (1980, pl. 6, fig. 33). Warén also proposed: “To avoid more confusion in this already very messy family it would perhaps be better to use that specimen as the lectotype, but this should be done during a revision of all the European species of the family”. The name *E. laevis* (Brown, 1827) is considered a synonym of *E. acicula* (Philippi, 1836) and the preferred use of Philippi’s name is based on discussion in van Aartsen (1994). Warén (1991) studied specimens determined as *E. compactilis* in the G.O. Sars collection at the ZMO, pointing out that they are young specimens of *E. scillae* (Scacchi, 1835). Anyway, when discussing his new species *Eulimella ataktos* Warén, 1991, he pointed out that “It is possible that this new species is what J.T. Marshall (1900: 335) called *Odostomia compactilis*, but search in BMNH [now NHMUK] did not reveal any specimens in the Sykes collection of the *Porcupine* material that J. T. Marshall has studied”.

Van Aartsen (1994) designated as lectotype of *E. compactilis* the specimen at USNM n° 132573, figured by Warén (1980, pl. 6, fig. 33), re-figured it with a new photo (Aartsen, 1994, fig. 18) and described it as “The lectotype is 4.0 mm, the topwhorls are helicoid with axis about 90° to the main shell axis. The whorls are relatively low and the growthlines are vertical or orthocline. The shell surface seems smooth but shows a very fine spiral sculpture viewed through the microscope. The striation is much finer than that in the related species *E. scillae* (Scacchi, 1835) and *Eulimella acicula* (Philippi, 1836)”. The species was indicated as not present in the Mediterranean.

Schander (1995) reported “van Aartsen (personal communication) does not agree with the opinion of Warén (1991) on the synonymy of *O. compactilis* in Sars (1878) and considers *O. compactilis* from Lofoten, as figured and described in Warén (1980) belongs to a species separate from *E. ataktos*, *E. scillae*, *E. ventricosa* and *E. acicula*”. Unfortunately, in the lectotype description, the indication whether the growth lines are straight or flexuous was missing, and this is important because the flexuous growth lines are a key character of the *E. scillae* complex.

To sum up: the syntype of *E. compactilis* at USNM (n° 132718) is *E. acicula* (fide Warén, 1980). It is quite strange that Jeffreys considered specimens of *E. acicula* as a variety of *E. scillae*. Possibly this was due to a later incorrect sample labelling or samples mix-up. Van Aartsen (1994) selected a lectotype of *E. compactilis*, among the material submitted to Jeffreys by Sars (USNM 132573), well aware that it was not conspecific with the syntype, and much more similar to *E. ataktos* than to *E. scillae*. Practically van Aartsen (1994) selected the name-bearing type of *E. compactilis* in order to maintain valid the name. This could be not in contrast with the article 72 a (i) of ICZN Third Edition (valid at the time), because

when *E. compactilis* was considered by Jeffreys (1884) a valid species, he made reference to the Sars’ drawing and to material received by Sars. The revalidation done by van Aartsen (1994) was overlooked by following Authors (e.g. Peñas & Rolán, 1997), therefore *E. compactilis* is still considered synonym of *E. acicula* (WoRMS accessed on 30 Dec. 2020). Høisæter (2014, fig. 98) illustrated some specimens from the Sars’ material at the Natural History Museum, University of Oslo, with number NHMO D997, that is the same material studied by Warén (1991), concluding that it was a valid species “distinguished among other things, from *E. scillae* by its protoconch”. The protoconch of these specimens is A1, just a little protruding, while selected lectotype figured by Aartsen (1994, fig. 18) shows a well protruding type A2 protoconch. Therefore, they are clearly not conspecific and the *E. compactilis* sensu Høisæter (2014) needs a new name.

To solve this taxonomic problem, it is not possible to use a substitute name (*nomen novum*), because there is not an older name to replace, so the right way is proposing a new specific name. As this is only a taxonomic act, then the holotype is selected among preserved specimens described and figured by Høisæter. This is why the examined material from the Mediterranean has been listed as “Additional material”.

### *Eulimella compactilis* (Jeffreys, 1867)

1878 *Eulimella compactilis* - G. O. Sars, p. 208, pl. 22, fig. 15.

1980 *Eulimella compactilis* - Warén, p. 37, pl. 6, fig. 33 (USNM 132573).

1994 *Eulimella compactilis* - Aartsen, p. 99, fig. 18 (USNM 132573).

Description from Aartsen (1994): “The lectotype is 4.0 mm, the topwhorls are helicoids with axis about 90° to the main shell axis. The whorls are relatively low and the growthlines are vertical or orthocline. The shell surface seems smooth but shows a very fine spiral striation viewed through the microscope. This striature is much finer than that in the related species *E. scillae* (Scacchi, 1835) and *Eulimella acicula* (Philippi, 1836)”.

Comparing photos of the same specimen in Warén (1980, pl. 6, fig. 33) and van Aartsen (1994, fig. 18), there is a remarkable difference in H/d ratio, that in the Warén’s photo is about 2.5, while in the Aartsen’s photo is about 2.1. It seems that in Aartsen’s photo the specimen was inclined, with apex upwards, so that the shell appears to be stouter. Therefore Warén’s photo, even if quite small and dark, is considered to better represent this species.

### Type material

The specimen from the Lofoten Islands (Norway), deposited at the USNM with number 132573, figured by Warén (1980, pl. 6, fig. 33) and by van Aartsen (1994, fig. 18).

# *Eulimella hoeisaeteri* n. sp. and its occurrence in the Mediterranean Sea (Mollusca: Pyramidellidae)

Pasquale Micali\*

\* via Papiria 17, 61032  
Fano (PU), Italy,  
lino.micali@virgilio.it

### Abstract

*Eulimella compactilis* (Jeffreys, 1867) is a poorly known species, described on material from the North-East Atlantic. This species is currently erroneously considered a synonym of *E. acicula* (Philippi, 1836), although it was considered valid by van Aartsen (1994). *Eulimella compactilis* has been incorrectly used for a clearly different species, that is here described as new and named *Eulimella hoeisaeteri* n. sp. Recent specimens of *E. hoeisaeteri* have been found in deep waters of the Ligurian, Tyrrhenian and Adriatic seas.

### Key words

Mollusca, Mediterranean, Pyramidellidae, *Eulimella hoeisaeteri*.

### Riassunto

[*Eulimella hoeisaeteri* n. sp. e sua presenza nel Mediterraneo (Mollusca: Pyramidellidae)]. *Eulimella compactilis* (Jeffreys, 1867) è una specie poco conosciuta, descritta su materiale dall'Atlantico nord-orientale. Questa specie è attualmente erroneamente considerata sinonimo di *E. acicula* (Philippi, 1836), sebbene sia stata validata da van Aartsen (1994). Questo nome è stato erroneamente usato per una specie chiaramente diversa, che viene qui descritta come nuova, col nome di *Eulimella hoeisaeteri* n. sp. Esemplari attuali di *E. hoeisaeteri* sono stati rinvenuti in acque profonde dei mari Ligure, Tirreno e Adriatico.

### Parole chiave

Molluschi, Mediterraneo, Pyramidellidae, *Eulimella hoeisaeteri*.

## Introduction

*Eulimella compactilis* (Jeffreys, 1867) is a poorly known name, based on material from the North-East Atlantic. This name is currently considered synonym of *E. acicula* (Philippi, 1836) based on Warén (1980) opinion, who studied the type material, but it was later validated by van Aartsen (1994). This name was incorrectly used by Høisaeter (2014) for a clearly different species. The present work intends to discuss the use of this name.

## Material and methods

The recent material was found in shell grit obtained by fishermen operating with trawling nets in deep waters (400-500 m) of the South Ligurian, Tyrrhenian and Adriatic seas. The preservation state of the specimens is variable, but no one has traces of soft parts. Nevertheless, I exclude the possibility that specimens are of sub-fossil origin, because no fossil material was present in the shell grit samples.

Protoconch terminology and definitions follow Van der Linden & Eikenboom (1992).

Acronyms: NHMUK: The Natural History Museum, U.K., London; MZB: Museo di Zoologia dell'Università di Bologna; USNM: United States National Museum, Washington DC; ZMBN: University Museum of Bergen, Natural History Collections; ZMO: Zoologisk Museum,

Oslo University; Francesco Giusti private collection, Livorno (FGL); Pasquale Micali private collection, Fano (PMF).

## Results and discussion

Jeffreys (1867) described the *Odostomia scillae* var. *compactilis* Jeffreys, 1867 from the Hebrides islands, with the following diagnosis "Shell thinner, much smaller, and not so strongly keeled. L[ength]. 0.1, B[readth]. 0.03". Dimensions were in inches, corresponding to a height of 2.5 mm and a width of 0.75 mm. Jeffreys (1884) elevated the variety to a valid species, reporting it for the Lofoten, west Norway, Shetland and the Hebrides at depths of 50-300 fathoms (roughly corresponding to 90-550 m), adding "Possibly *O. (Eulimella) superflua* Monterosato, from Palermo". It is important to mention that Jeffreys (1884) made reference to Sars's drawing (1878, Pl. 22, fig. 15), the only one showing this species, thus recognizing that this drawing represented *E. compactilis*.

Marshall (1893) only added that Sars dredged it in Norway. Marshall (1900) listed further northern Atlantic records (off Scilly and off Ireland). Marshall (1918) characterized this species as "*O. compactilis* occupies a middle place between *O. acicula* and *O. scillae*, and is a somewhat critical species". Warén (1980) studied Jeffreys' type material at the USNM, pointing out that the syntype from

soft parts is envisaged to confirm the placement in this genus.

*Kellia pumila* J. de C. Sowerby, 1844, is based on fossil material from the British Coralline Crag (Zanclean). Valves from the Jeffreys collection at USNM have been figured by Aartsen & Carrozza (1997), while Oliver & Lützen (2011) moved *K. pumila* to the new genus *Draculamyia* and designated a lectotype. The new species differs from *D. pumila* for the rounded instead of transverse-sloping outline, the slightly concave instead of slightly convex anterior-dorsal margin and a well rounded ventral margin.

The new species clearly differs from *Kelliopsis jozinae* for the different hinge, the thicker shell and the different outline in the anterior dorsal margin. Both *K. jozinae* and the new species have been found together in some shell grit samples. *Epilepton parrussetensis* (Giribet & Peñas, 1998) reported from the Mediterranean coasts of Spain (Giribet & Peñas, 1998) and the Strait of Messina (Trono & Perna, 2008) clearly differs from the new species for the presence of a ridge surrounding the apex on the prodissococonch. *Mancikellia divae* van Aartsen & Carrozza, 1997 is a doubtful species based on Pliocene material from English Crag and reported by Aartsen & Carrozza (1997) for Sicily, Sardinia, Spain and Atlantic coast of Portugal and France. Giribet & Peñas (1998), after studying the holotype and some paratypes, considered that the Pliocene holotype is different from the recent material cited in original description, and that Recent material should be referred to *E. parrussetensis*. The specimen named *Kelliopsis jozinae* in Segers et al. (2009) could belong to the new species, because the photo (p. 78, fig. 12) clearly shows the broad concentric ridges and an elongate, slightly concave anterior dorsal slope, while *K. jozinae* has some very faint growth lines and a more rounded outline. This species is reported by the authors from off Madeira and the Desertas Islands (North-east Atlantic) at depths between 170 and 407 m.

Also the specimens named *Draculamyia porobranchiata*, in Utrilla et al. (2020) from Gazul mud volcano (Gulf of Cádiz) at depth 427-461m and the left valve named “cf. *D. porobranchiata*” in Albano et al. (2020) from Rosh Carmel plateau (off Atlit, Israel) at depth of 92 m, may belong to the new species.

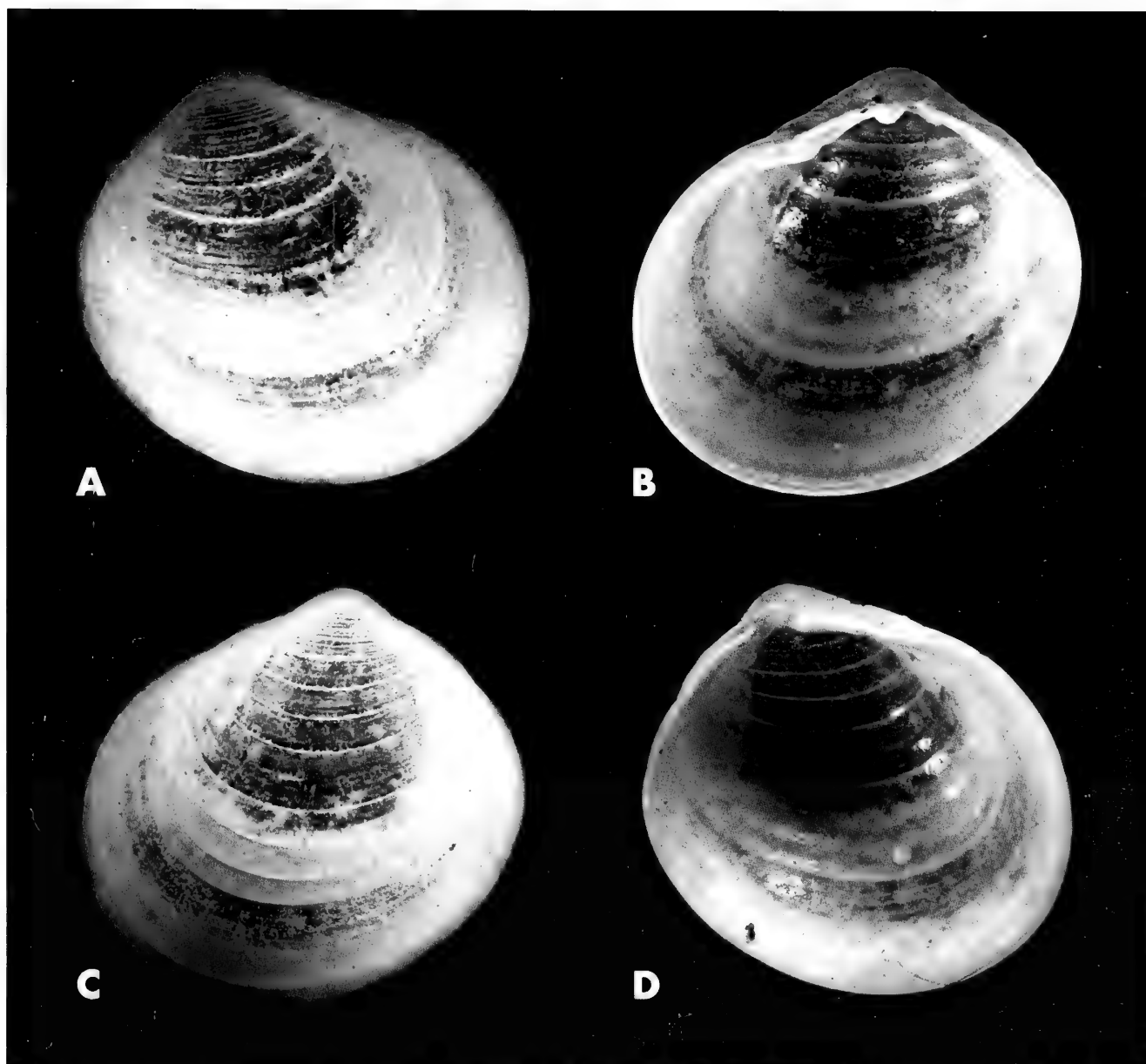
## Acknowledgements

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**Fig. 1. A-D.** *Draculamyia carlosbranai* n. sp. Holotype, off Capo Corso (north Corsica), 400 m, H = 1.0 mm, L = 1.0 mm. **A.** External view of right valve. **B.** Internal view of right valve. **C.** External view of left valve. **D.** Internal view of left valve.

**Fig. 1. A-D.** *Draculamyia carlosbranai* n. sp. Olotipo, al largo di Capo Corso (nord Corsica), 400 m, H = 1,0 mm, L = 1,0 mm. **A.** Vista esterna della valve destra. **B.** Vista interna della valve destra. **C.** Vista esterna della valve sinistra. **D.** Vista interna della valve sinistra.

the fossil species *G. prosperi* Van der Meulen, 1951, an extinct Plio-Pleistocene species reported in northern Europe (Janssen & Van Der Slik 1972) from littoral deposits. The outline and external sculpture is similar to the new species, but *Glibertia* differs for the more rounded outline, the large and depressed prodissococonch, the lateral teeth much shorter on both valves and the weaker cardinal tooth on the right valve.

A genus that seems to be more appropriate is *Draculamyia* Oliver & Lützen, 2011, having as type species *Draculamyia porobranchiata* Oliver & Lützen, 2011, based on material from the Northeast Atlantic, from 69°N to 44°N at bathyal depths of 1100 m to 1350 m and not reported for the Mediterranean sea. The shell of genus *Draculamyia* was described by Oliver & Lützen (2011) as: "Shell small, ovoid, RV with a single cardinal peg and single anterior and posterior laterals; LV without a car-

dinal peg and with single anterior and posterior laterals as extensions of the shell margin. Ligament internal on a deeply sunken, posteriorly directed resilifer".

The new species strongly resembles *Draculamyia porobranchiata* from which it differs for the more prominent umbo, anteriorly directed. In the right valve the lateral teeth are stronger, longer and separated from the dorsal margin by a groove, the anterior tooth is placed more distant from the prodissococonch, the resilifer not oblique. The left valve has a deep, triangular notch for the tooth of the other valve, while *D. porobranchiata* has a wide and regularly curved profile. The prodissococonch is more acute and prominent, having a diameter of about 225 µm, against 470-550 µm. The type species of *Draculamyia* is a fluid-feeding ectoparasite associate to organisms living in very deep waters. The placement in *Draculamyia* is only based on shell characters, and study of



*Draculamya carlosbranaei* n. sp.  
(Fig. 1. A-E)

## Type material and other examined material

Holotype (H = 1.0 mm, L = 1.0 mm, W = 0.85 mm) off Capo Corso (north Corsica), 400 m depth, from trawling fishing boat, obtained in 1996, deposited at the MNHN with number MNHN-IM-2000-35881.

Paratype 1 (H = 0.875 mm, L = 0.915 mm, W = 0.575 mm), type locality. Specimen with closed valves, deposited at the MNHN with number MNHN-IM-2000-35882. Paratypes, same locality data as for holotype. Paratype 2 (FSL), paratype 3 (PMF), paratype 4 (CSL), paratype 5 (FGL), paratype 6 (LRC).

## Other examined material

FSL collection: one specimen and 18 valves from the type locality, two specimens and nine valves from between Capraia Island and Capo Corso, 350 m depth.

PMF collection: three valves from off Capo Corso (north Corsica), 500 m depth; three specimens and two loose valves from the Alboran sea, 33-49 m depth (*dedit* A. Peñas).

## Type locality

About 30 km NW of Capo Corso (North Corsica, South Ligurian Sea), about 400 m depth, in shell grit.

## Etymology

The species is named after Carlo Sbrana, the well-known malacologist and good friend of both authors, who provided the shell grit where the new species was found for the first time.

## Description of holotype

Shell moderately thick, inflated, equivalve, inequilateral, beaks behind the middle line, directed inwards and forwards. Outline oval, inequilateral, with the anterior portion more extended. The ventral margin is well regularly rounded. The beaks are prominent, with a prodissoconch diameter of about 225  $\mu$ m. Ligament internal, situated below and behind the beaks, in a resilifer placed posterior to cardinal tooth. Right valve with a single, stout, tubercular cardinal tooth, placed slightly anterior to the beak, and a single anterior and posterior laterals. The anterior lateral is about double length of the posterior. The cardinal tooth is placed slightly anterior to the beak. Left valve with two very poorly developed lateral teeth. External sculpture of numerous growth lines and irregularly spaced growth stops (about 11) that form small steps, more or less marked, in the valve profile. The growth lines are stronger near the prodissoconch and near the ventral margin. Margin smooth. Muscle scar indistinct. Periostracum very thin, light brown. Shell color is white. The external sculpture

may be seen from inside. The holotype measures H = 1.0 mm, L = 1.0 mm, W = 0.8 mm. The largest examined valve measures H = 1.2 mm, L = 1.25 mm.

## Variability

External sculpture is variable: in some specimens, the growth stops, numbering 4-11, are all well marked, forming steps in the valve profile. In some others, only a few growth stops are well marked and step-forming, while in others the growth stops are simple irregularities in the growth lines. Also the valve width (W) is a little variable.

## Distribution

*Draculamya carlosbranaei* is known from the Alboran Sea, north-east Spain, near Barcelona; the Tuscan Archipelago; the coast of Israel (Albano et al., 2020) and therefore, seems to be widely distributed in the Mediterranean, between 33 and 500 m. Its presence in the nearby Atlantic is possible, based on records in Segers et al. (2009) and in Utrilla et al. (2020).

## Discussion

This species was recorded by Peñas et al. (2006) under the name *Kelliopsis* sp. These authors found about 80 specimens, plus over 200 loose valves from near Alboran Island, mostly at depths of 33-49 m. The species figured as *Arculus* sp. by Giribet & Peñas (1997) from the "El Garraf" coast (off Barcelona, NE Spain) was regarded as conspecific by Peñas et al. (2006).

The placement in the genus *Kelliopsis* Verrill & Bush, 1898 has been investigated, because the hinge looks quite different from that of *K. jozinae* van Aartsen & Carrozza, 1997. The genus *Kelliopsis* was described by Verrill & Bush (1898) as: "The shell, in size and form, resembles *Kellia* and *Montacuta*. In both valves there is a small, prominent, anterior tooth and a low, elongated, thickened posterior ridge, scarcely amounting to a tooth. The resilium is large and is attached to an elongated, oblique excavation on the proximal edge of the posterior tooth-like ridge, and also to a triangular pit beneath the beak; it bears a large, elongated, curved ossicle. Soft parts not observed. This genus appears to be closely allied to *Montacuta*, but differs in not having a definite, raised, posterior tooth; in having a large, elongated posterior cartilage, bearing a large ossicle attached to a special groove along a tooth like ridge; and in having the structure of the hinge in both valves nearly the same. It resembles *Erycina* in the position of the resilium, but the latter has two large teeth in both valves". From this description, it is clear that the new species cannot be placed in *Kelliopsis* due to the difference in the hinge, having a cardinal tooth only on the right valve and lateral teeth, of different shape, on both valves.

The genus *Glibertia* Van der Meulen, 1951 is based on

# Draculamyia carlosbranai n.sp. (Bivalvia: Montacutidae) from the Lusitanian malacological bioprovince

Franco Siragusa\* & Pasquale Micali# (✉)

\* via Cocoluto Ferrigni  
44, 57125 Livorno, Italy,  
franco.siragusa1@gmail.com

# via Papiria 17, 61032  
Fano (PU), Italy,  
lino.micali@virgilio.it

**Abstract**

The new species *Draculamyia carlosbranai* is described on material found in shell grit trawled near Capraia Island (South Ligurian Sea) at a depth of 350 m. The new species had already been reported under other names for Mediterranean and possibly North-east Atlantic specimens, but never described as a new species. The most similar species is *Draculamyia porobranchiata* Oliver & Lützen, 2011, from which the new species mainly differs in having a more prominent anteriorly directed umbo, a smaller (225 µm, against 470-550 µm) prodissoconch, stronger lateral teeth, separated from the margin by a groove in the right valve and a deep triangular notch for the tooth in the left valve. The characteristics of the hinge, the thicker shell and the outline also clearly separate the new species from *Kelliopsis jozinae* van Aartsen & Carrozza, 1997.

**Key Words**

*Draculamyia carlosbranai*, Lusitanian bioprovince, Mediterranean, new species

**Riassunto**

[*Draculamyia carlosbranai* n.sp. (Bivalvia: Montacutidae) dalla bioprovincia malacologica lusitanica]. Viene descritta la nuova specie *Draculamyia carlosbranai* n. sp., rinvenuta in campioni di detrito dragato presso l'isola di Capraia (Mar Ligure meridionale), alla profondità di 350 m. La nuova specie era già stata segnalata con altri nomi dal Mediterraneo e probabilmente dall'Atlantico nord-orientale, ma mai descritta come nuova specie. La specie più simile è *Draculamyia porobranchiata* Oliver & Lützen, 2011, da cui differisce principalmente per l'umbone più prominente e diretto verso il margine anteriore, la prodissoconca più piccola (225 µm, contro 470-550 µm), i denti laterali della valva destra più robusti e separati dal margine da un solco, la valva sinistra con un profondo incavo triangolare ove si inserisce il dente cardinale. Le caratteristiche della cerniera, la conchiglia più spessa e il profilo, separano facilmente la nuova specie anche da *Kelliopsis jozinae* van Aartsen & Carrozza, 1997.

**Parole chiave**

*Draculamyia carlosbranai*, bioprovincia Lusitanica, Mediterraneo, nuova specie

## Introduction

The genus *Draculamyia* Oliver & Lützen, 2011 was described quite recently, the type species is *D. porobranchiata*, reported from the North-east Atlantic (69°N to 44°N), at depths of 1100-1350 m. The Authors (Oliver & Lützen, 2011) stated that “All verified records from the Mediterranean have proved to be of *Mancikellia divae*”. WoRMS (accessed on 28/11/2020) does not list any other recent species in the genus *Draculamyia*, while MolluscaBase lists the fossil *D. pumila* (J. de C. Sowerby, 1844). As discussed below, this species is already present in the literature but was placed in the genera *Arculus* Monterosato, 1909 or *Kelliopsis* Verrill & Bush, 1898. The finding of specimens in the Tuscan Archipelago allowed a detailed study of the species characteristics and convinced us that it was an undescribed species.

## Material and methods

The studied material was found in sediment samples consisting of muddy sand taken by a fishing boat trawling between Capraia Island and Capo Corso (South Ligu-

rian sea), at depth between 350 and 500 m, from 1996 onwards. The dried sediment was then sieved, and the various fractions sorted out for shells under a stereomicroscope. Images were taken by Philippe Maestrati/MNHN using the Dun, Inc. BK PLUS Digital Imaging System.

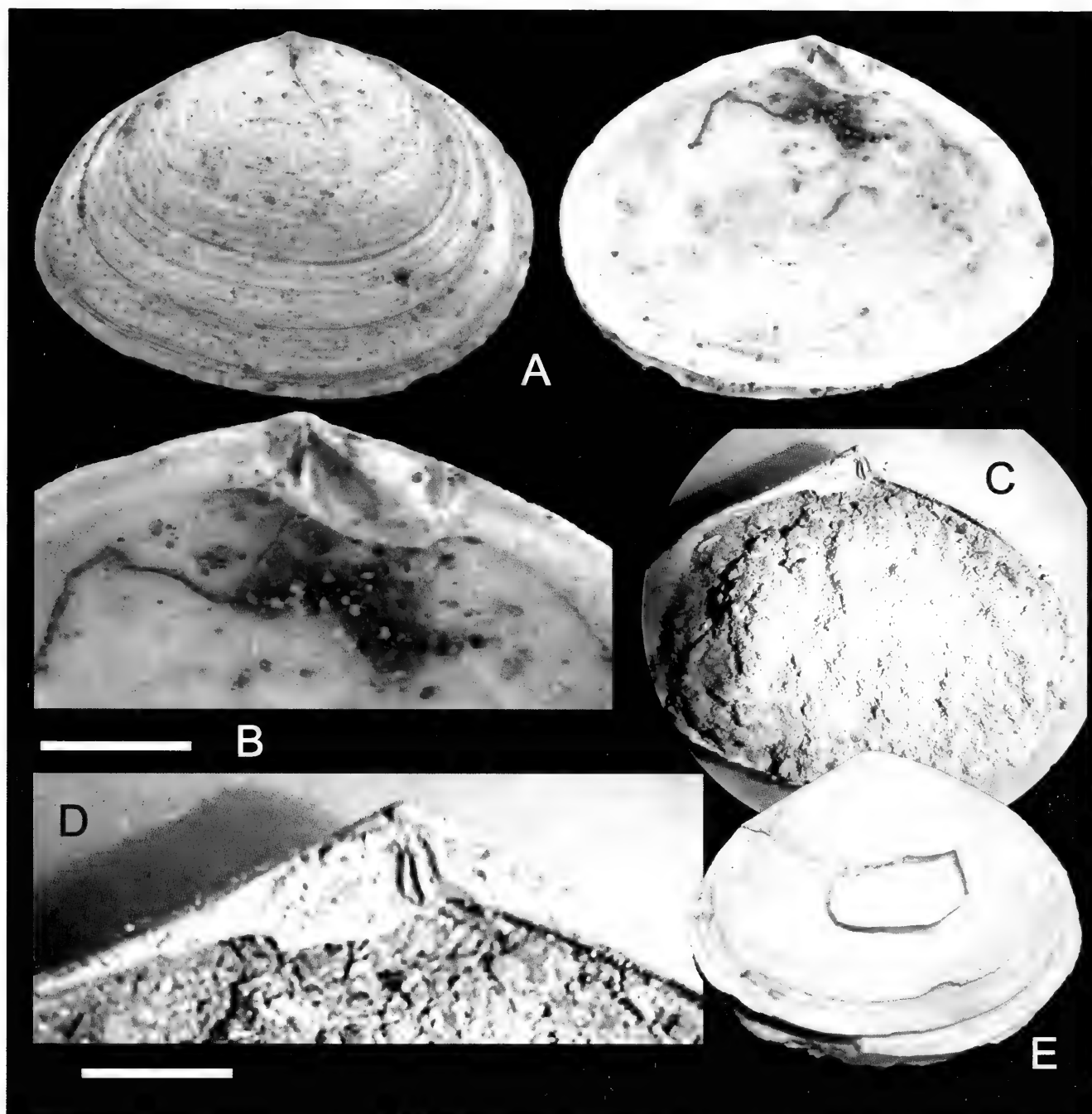
Abbreviations and acronyms:

MNHN Muséum National d'Histoire Naturelle, Paris (MNHN); Franco Siragusa private collection, Livorno (FSL); Pasquale Micali private collection, Fano (PMF); Francesco Giusti private collection, Livorno (FGL), Carlo Sbrana private collection, Livorno (CSL), Luigi Romani private collection, Capannori (LU) (LRC). For shell dimensions: H= height (umbo-ventral distance); L= length (antero-posterior distance); W= width.

## Systematic

Superfamily Galeommatoidea J. E. Gray, 1840  
Familia **Montacutidae** W. Clark, 1855  
Genus **Draculamyia** Oliver & Lützen, 2011  
(type species *D. porobranchiata*  
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**Fig. 2. A, B.** *Scrobicularia plana* (da Costa, 1778). **A.** Treppie (Siena), Zancleano, valva destra, L = 21 mm CMC. **B.** Treppie (Siena), Zancleano, valva destra particolare cerniera, scala = 3 mm CMC. **C-E.** *Scrobicularia* (s-l) sp. **C.** Monte Antico (Grosseto), Zancleano, valva sinistra, L = 20 mm, esemplare distrutto. **D.** Monte Antico (Grosseto), Zancleano, valva sinistra, particolare cerniera, scala = 3 mm esemplare distrutto. **E.** Monte Antico (Grosseto), Zancleano, valva destra, L = 20,5 mm CMB.

**Fig. 2. A, B.** *Scrobicularia plana* (da Costa, 1778). **A.** Treppie (Siena), Zanclean, right valve, L = 21 mm, CMC. **B.** Treppie (Siena), Zanclean, right valve, detail of the hinge, scale bar = 3 mm CMC. **C-E.** *Scrobicularia* (s-l) sp. **C.** Monte Antico (Grosseto), Zanclean, left valve, L = 20 mm, destroyed specimen. **D.** Monte Antico (Grosseto), Zanclean, left valve, detail of the hinge, scale bar = 3 mm, destroyed specimen. **E.** Monte Antico (Grosseto), Zanclean, right valve, L = 20.5 mm, CMB.

mantenuta per il momento con nomenclatura aperta come *Scrobicularia* (s.l.) sp.

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## Etimologia

Il nome della nuova specie deriva dalle piccole dimensioni e dal Pliocene, periodo in cui ha vissuto.

## Altro materiale esaminato

Velerin Carretera (Estepona, Malaga, Spagna), Piacenziano inferiore, 8 valve CMB.

## Descrizione

Conchiglia molto piccola ( $L < 15$  mm), guscio sottile, subtrapezoidale. inequilaterale, moderatamente inflata, regione anteriore arrotondata, regione posteriore troncata bruscamente. Umboni situati a un quarto della lunghezza dalla fine della regione posteriore. Il margine anterodorsale ha una leggera pendenza, il margine posterodorsale scende ripidamente, il margine ventrale è regolarmente arrotondato. La scultura è composta da sottili striature concentriche disposte in maniera irregolare. Nella valva destra è presente un dente cardinale anteriore piccolo, sottile e lamellare e un dente cardinale posteriore bifido. Nella valva sinistra il dente cardinale anteriore è trigonale, bifido, il cardinale posteriore è costituito da una lamina sottile, molto allungata. Denti laterali debolissimi, distanti dai cardinali. Seno palale non visibile. Impronte muscolari subuguali di forma allungata.

## Distribuzione

Sulla base del materiale esaminato, la specie doveva vivere a profondità corrispondenti al piano circolatorale profondo, con distribuzione cronostatigrafica limitata al Piacenziano inferiore.

## Osservazioni

*Syndesmyella pliominor* n.sp., di cui si è potuto esaminare sino ad ora solo un ridotto numero di esemplari, è stata ascritta al genere *Syndesmyella* Sacco, 1901, che viene qui considerato valido, per la forma delle valve e per le caratteristiche della cerniera. Successivamente alla sua descrizione, *Syndesmyella* Sacco, 1901 è stato messo in sinonimia sia con il genere *Semele* (Dall, 1915; Marasti & Raffi, 1980, Monegatti & Raffi, 2001) sia con il genere *Abra* (Boss, 1972). Sacco (1901: 123) descrisse *Syndesmyella* come nuovo sottogenere con queste parole: "Le forme di questo gruppo ricordano a primo tratto esternamente alcune *Macoma*, ma per l'apparato cardinale sono piuttosto da collegarsi colle *Syndesmya*, dalle cui forme tipiche differiscono abbastanza nettamente sia per la forma più rotondeggiante, sia specialmente per i denti laterali ridotti a semplici pieghe situate lontane dall'apparato cardinale centrale." Specie tipo del sottogenere venne designata *Syndesmyella plioovoides* del Pliocene dell'Astiano. Purtroppo il materiale tipo sembra essere scomparso, non essendo presente nel catalogo dei tipi della collezione Bellardi-Sacco (Merlino,

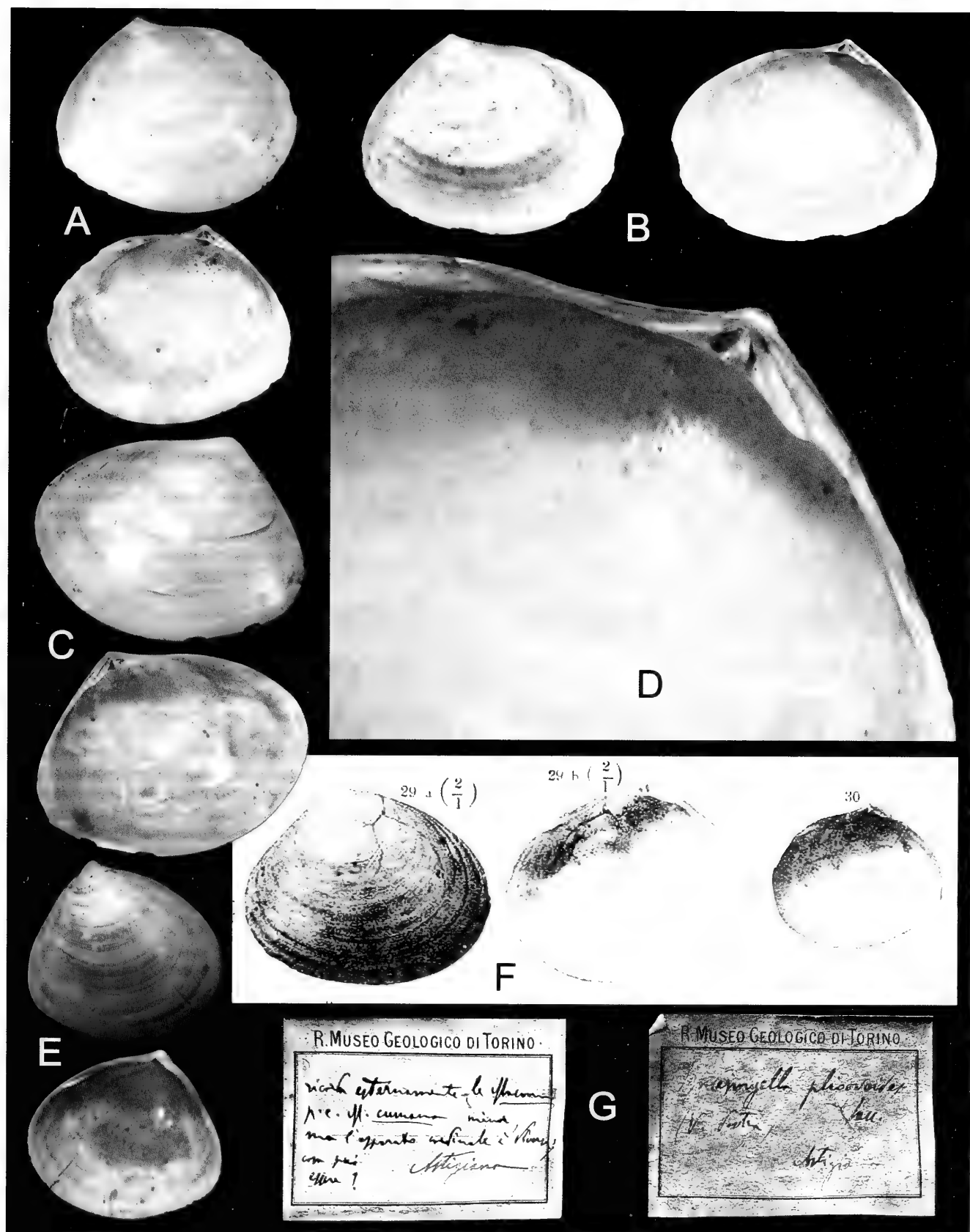
2007). Un rapido controllo nella collezione Bellardi-Sacco depositata a Torino, ha portato al ritrovamento di una scatola con cartellinatura originale (Fig. 1. G) ma priva degli esemplari (com. pers. A. Pistarino). La figura originale di *Syndesmyella plioovoides* (p. 122, tav. 26, figg. 29-30) (Fig. 1. F) evidenzia comunque differenze importanti rispetto a *Syndesmyella pliominor* n. sp. sia per la forma delle valve, tendenzialmente subrotonda nella prima, decisamente subtrapezoidale nella seconda, sia soprattutto nella differente forma dei denti laterali della cerniera che in *plioovoides* sono sempre più lunghi che in *pliominor*.

Una valva riferibile probabilmente al genere *Syndesmyella* (Fig. 1. E), è stata rinvenuta nella località di Teti Borelli (Torino) di età Messiniana (Pavia & Robba, 1979; Pavia, 1991; Davoli, 1995). Rispetto a *Syndesmyella pliominor* n. sp., questo esemplare presenta dimensioni minori e una forma più triangolare e decisamente più troncata posteriormente, purtroppo la cerniera parzialmente danneggiata non permette ulteriori considerazioni e l'esemplare viene qui mantenuto con nomenclatura aperta come *Syndesmyella* ? sp.

Per il tipo di cerniera e la forma delle valve *Syndesmyella pliominor* n. sp., non presenta somiglianze con altre Semelidae del Pliocene europeo.

In seguito alle ricerche all'interno della famiglia Semelidae, viene confermata anche la presenza fossile di *Scrobicularia plana* (da Costa, 1778) con il rinvenimento di una valva nella località di Treppiè (Siena) di età zancleana (Pantoli & Raffi, 1981) (Fig. 2. A, B). Si tratta del secondo rinvenimento noto, per questa regione, dopo quello di Chirli (2015). Le segnalazioni fossili riferite al Pliocene, di questo taxon sono piuttosto rare, in particolare quelle supportate da un'iconografia completa e riconoscibile della specie. In questo senso, se si eccettua Chirli (2015, tav. 28, figg. 12-15), Wood (1851, tav. 22, fig. 14) è stato l'unico a figurarne chiaramente un esemplare completo per il Pliocene inglese. Fontannes (1882, tav. 2, figg. 14-15) per il Pliocene della Francia meridionale, ne illustra solo la cerniera, riferendola alla varietà *piperata*. Dubbia la segnalazione di Sacco (1901, tav. 25, fig. 25) come ammesso dallo stesso autore: "potrebbe anche trattarsi di una valva anomala di *S. Cottardi* (Pevr.), ma col cattivo esemplare in esame non si può fare una precisa determinazione." (Sacco, 1901: 119).

Altri esemplari probabilmente appartenenti al genere *Scrobicularia*, sono stati rinvenuti nella località di Monte Antico (Grosseto) di età zancleana (Brunetti, 2014). Purtroppo l'unico esemplare completo, provvisto di cerniera (Fig. 2. C, D) è andato distrutto. Nella medesima località sono state rinvenute altre due valve (Fig. 2. E), ma non è stato possibile esaminarne la cerniera data l'estrema fragilità del guscio. Questi esemplari si differenziano nettamente da *Scrobicularia plana* per la forma delle valve, più decisamente triangolari, più sottili, fragili, e soprattutto, per il carattere della cerniera, che presenta due piccoli denti cardinali, sottili e acuti ed un ampio condroforo appiattito. Detto tipo di cerniera non ha corrispondenze con nessuna specie da noi conosciuta. Data la frammentarietà del materiale studiato, la specie è



**Fig. 1. A-D.** *Syndesmyella pliominor* n. sp. **A.** Paratipo 1, Velerin Carretera (Estepona, Malaga, Spagna), Piacenziano inferiore, valva destra L = 11,3 mm (MGGC24553A). **B.** Olotipo, Velerin Carretera (Estepona, Malaga, Spagna), Piacenziano inferiore, valva destra L = 14,2 mm (MGGC24553). **C.** Paratipo 2, Velerin Carretera (Estepona, Malaga, Spagna), Piacenziano inferiore, valva sinistra L = 11,3 mm (MGGC24553B). **D.** Olotipo, particolare cerniera scala = 3 mm (MGGC24553). **E.** *Syndesmyella* ? sp. Tetti Borelli (Torino), Messiniano, valva destra, L = 8 mm CDB. **F-G.** *Syndesmyella plioovoides* Sacco, 1901. **F.** Illustrazione originale da Sacco, 1901. **G.** Cartellini originali di *Syndesmyella plioovoides* MRSN.

**Fig. 1. A-D.** *Syndesmyella pliominor* n. sp. **A.** Paratype 1, Velerin Carretera (Estepona, Malaga, Spain), Lower Piacenzian, right valve, L = 11.3 mm (MGGC24553A). **B.** Holotype, Velerin Carretera (Estepona, Malaga, Spain), Lower Piacenzian, right valve, L = 14.2 mm (MGGC24553). **C.** Paratype 2, Velerin Carretera (Estepona, Malaga, Spain), Lower Piacenzian, left valve L = 11.3 mm (MGGC24553B). **D.** Paratype 1, detail of the hinge, scale bar = 3 mm (MGGC24553). **E.** *Syndesmyella* ? sp. Tetti Borelli (Torino), Messinian, right valve, L = 8 mm CDB. **F-G.** *Syndesmyella plioovoides* Sacco, 1901. **F.** Original illustration after Sacco, 1901. **G.** Originals labels of *Syndesmyella plioovoides* MRSN.



# *Syndesmyella pliominor* n. sp. (Bivalvia: Semelidae) per il Pliocene spagnolo

M. Mauro Brunetti\* (✉) & Massimo Cresti<sup>#</sup>

\*Calle Navas 106, 14511  
Navas del Selpillar,  
Spagna,  
mbrunetti45@gmail.com,  
(✉) corresponding author

<sup>#</sup>Via Argiano 8, 50026 San  
Casciano val di Pesa  
(Firenze), Italia,  
xcrema@inwind.it

## Riassunto

Viene descritta una nuova specie di Semelidae Stoliczka, 1870, per il Pliocene inferiore della Spagna meridionale: *Syndesmyella pliominor* n. sp. Il genere *Syndesmyella* Sacco, 1901 viene qui considerato valido per i caratteri della cerniera e per la forma delle valve. Un esemplare probabilmente dello stesso genere, proveniente dal Messiniano dell'Italia settentrionale, viene al momento considerato come *Syndesmyella?* sp. Sono inoltre inserite alcune brevi note sulla presenza nel Pliocene italiano del genere *Scrobicularia* Schumacher, 1815, comprendente *Scrobicularia plana* (da Costa, 1778) e *Scrobicularia* (s.l.) sp. nel Pliocene inferiore della Toscana.

## Parole chiave

Semelidae, *Syndesmyella*, Pliocene, sistematica.

## Abstract

A new species of Semelidae Stoliczka, 1870 is described for the lower Pliocene of southern Spain: *Syndesmyella pliominor* n. sp. The genus *Syndesmyella* Sacco, 1901 is considered valid due to both the ligament attributes and the valve shape. A second specimen, likely belonging to the same genus, from the Messinian of northern Italy, is classified, at date, as *Syndesmyella?* sp. Few additional notes on the existence of the genus *Scrobicularia* Schumacher, 1815 in the Italian Pliocene are added; the genus includes *Scrobicularia plana* (da Costa, 1778) and *Scrobicularia* (s.l.) sp. from the lower Pliocene of Tuscany.

## Key words

Semelidae, *Syndesmyella*, *Scrobicularia*, Pliocene, systematics.

## Introduzione

Lo studio di materiale fossile pliocenico proveniente dalla località di Estepona (Malaga, Spagna) ha portato al rinvenimento di una specie mai segnalata in precedenza per il Pliocene del Bacino Mediterraneo. Un altro esemplare forse riferibile al genere *Syndesmyella* è stato rinvenuto anche nel Messiniano dell'Italia settentrionale. Durante lo studio di questa nuova specie sono stati anche esaminati altri taxa della famiglia Semelidae Stoliczka, 1870, riferiti al genere *Scrobicularia* Schumacher, 1815. La famiglia Semelidae Stoliczka, 1870, comprende numerose specie e una decina di generi sia fossili che attuali, per la maggior parte attualmente viventi a poca profondità. Le presenze fossili di taxa di questa famiglia sono certe a partire dall'Eocene (Cossmann, 1886; Boss, 1972). Nel Pliocene del Bacino Mediterraneo sono finora segnalate 6 o 7 specie appartenenti per lo più al genere *Abra* Lamarck, 1818 (Sacco, 1901; Cerulli-Irelli, 1909; Marasti & Raffi, 1980; Cavallo & Repetto, 1992; Monegatti & Raffi, 2001; Chirli, 2015).

## Materiali e metodi

Il materiale esaminato proviene tutto da raccolte manuali di superficie. Sono state usate le seguenti abbreviazioni: L = larghezza massima della valva; MRSN =

Museo regionale Scienze Naturali di Torino, MGGC = Collezione Della Bella del Museo Geologico "G. Capellini" di Bologna; CDB = Collezione Della Bella, CMB = Collezione M. Brunetti; CMC = Collezione M. Cresti.

## Sistematica

Classe Bivalvia Linnaeus, 1758  
Superfamiglia Tellinoidea Blainville, 1814  
Famiglia Semelidae Stoliczka, 1870  
Genus *Syndesmyella* Sacco, 1901  
(specie tipo *Syndesmyella plioovoides*  
Sacco, 1901)

*Syndesmyella pliominor* n. sp.  
(Fig. 1A-D)

## Materiale tipo

Olotipo L = 14,2 mm MGGC24553; Paratipo 1 L = 11,3 mm MGGC24553A. Paratipo 2, L = 11,3 mm MGGC24553B.

## Località tipo

Velerin Carretera (Estepona, Malaga, Spagna), Piacenziano inferiore, coordinate 36°26'50.1"N 5°05'34.0"W, Vera-Peláez (2002), Guerra-Merchán et al. (2002), Landau et al. (2003).

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*Gibbula Guttadauri* - De Stefani & Pantanelli, 1879: 78.  
*Gibbula Guttadauri* - Pantanelli, 1884: 14.  
*Gibbula Guttadauri* - De Stefani, 1888, 201.  
*Gibbula* (s.s.) *guttadauri* - Glibert, 1962: 40.  
*Gibbula* (*Forskaelena*) *guttadauroi* - Spadini, 1987: 432, fig. 2.  
*Gibbula* (*Forskaelena*) *guttadauri* - Chirli, 2004: 72-73, pl. 29, figs. 6-10.

## Material examined

Guistrigona (1 exx. CVS), Pietrafitta (3 exx. CVS), Poggio Rotondo (12 exx., CVS), Terre Rosse (1 ex., CVS), Torretta (3 exx., MPE n. 334).

## Remarks

This species is uncommon from the Siena area, having slightly different characters from extant specimens (regularly curved and non-straight columella, slightly different profile).

## Stratigraphic distribution

Miocene: Montegibbio (Cocconi, 1873). Pliocene: Spain, (Martinell, 1984); Emilia (Cocconi, 1873); Calabria and Sicily (Seguenza, 1877), Liguria and Piedmont (Sacco, 1896), Modena area (Coppi, 1981). Pleistocene: Grammichele (Malatesta, 1960), Monte Mario (Cerulli Irelli, 1916).

## Geographical distribution

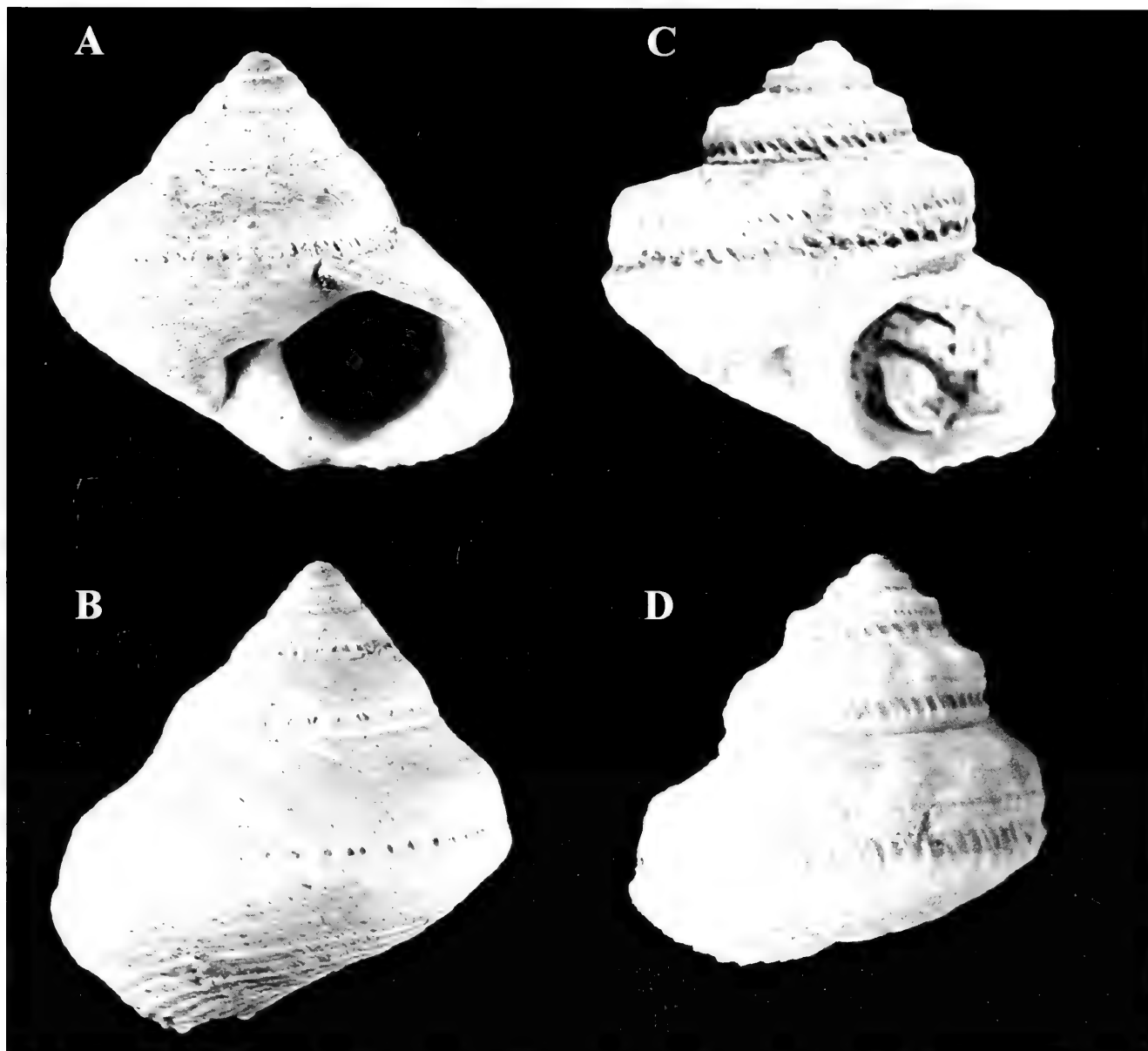
It currently lives in the western Mediterranean and Adriatic Sea (Ghisotti and Melone, 1972, Poppe and Goto, 1992).

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**Fig. 6.** Subgenus *Forskalela* Iredale, 1918. **A, B.** *Gibbula (Forskalela) depressula* Sacco, 1896. H = 8.7 mm. Piacentian of Poggio Rotondo. **C, D.** *Gibbula (Forskalela) guttadauri* (Philippi, 1836); Piacentian of Poggio Rotondo. H = 7.3 mm.

**Fig. 6.** Sottogenere *Forskalela* Iredale, 1918. **A, B.** *Gibbula (Forskalela) depressula* Sacco, 1896. H = 8,7 mm. Piacenziano di Poggio Rotondo. **C, D.** *Gibbula (Forskalela) guttadauri* (Philippi, 1836); Piacenziano di Poggio Rotondo. H = 7,3 mm.

Chirli, 2004; Cocconi, 1873; Seguenza, 1877. Pleistocene: Cerulli Irelli, 1913; Malatesta, 1960; Buccheri, 1970).

### Geographical distribution

*G. fanulum* currently lives in the Mediterranean and along the Portuguese coasts (Ghisotti and Melone, 1972; Poppe & Goto, 1992) in *Posidonia* meadows.

### *Gibbula (Forskalela) depressula* Sacco, 1896 (Fig. 6. A, B)

*Forskälia depressula* - Ferrero Mortara et alii, 1984: 268, pl. 46, figs. 7 a-c.

*Gibbula (Forskalela) depressula* - Spadini, 1987; p. 430: fig. 1.

### Material examined

Conicchio (7, CVS); Monte Calcinaio (2, CVS).

### Remarks

The species has a typical and easily recognized form, which can be considered an extreme modification of *G. fanulum*, from which it is readily distinguished by an absence of tubercles. It may show slight adapical undulations, but never tubercles as in *G. fanulum*.

Spadini (1987) figured a young specimen that does not reflect the characters of the species. Lozano Francisco & Vera Palaez (2002) list the species, without description or illustration, from the Early Pliocene of Estepona, but it is not reported in Landau, Marquet & Grigis (2002).

### Stratigraphic distribution

Pliocene (Sacco, 1896; Spadini, 1987).

### *Gibbula (Forskalela) guttadauri* (Philippi, 1836) (Fig. 6. C, D)

notypic variations of a single species related to different environments: the first to sandy environments, the second to rocky substrates.

### Stratigraphic distribution

Since it has generally been considered a conspecific of *G. fanulum*, it is impossible to establish the real stratigraphic and geographic distribution of the species.

### *Gibbula (Forskalela) fanulum* (Gmelin, 1790) (Fig. 5. C, D)

*Gibbula (Forskalela) fanulum* - Malatesta, 1974: 166; pl. 13: fig. 1.

*Gibbula (Forskalela) fanulum* - Spadini, 1987: 432, fig. 2-4.

*Gibbula (Forskalela) fanulum* - Chirli, 1988, pl. 1 fig. 1.

*Gibbula fanulum* - Pracchia, 1997: 19-20, fig. 2.

*Gibbula (Forskalela) fanulum* - Landau, Marquet & Grigis, 2003: 49-50, pl. 11, fig. 1.

*Gibbula (Forskalela) fanulum* - Chirli, 2004: 70-72, pl. 28, figs. 11-12, pl. 29, figs. 1-5.

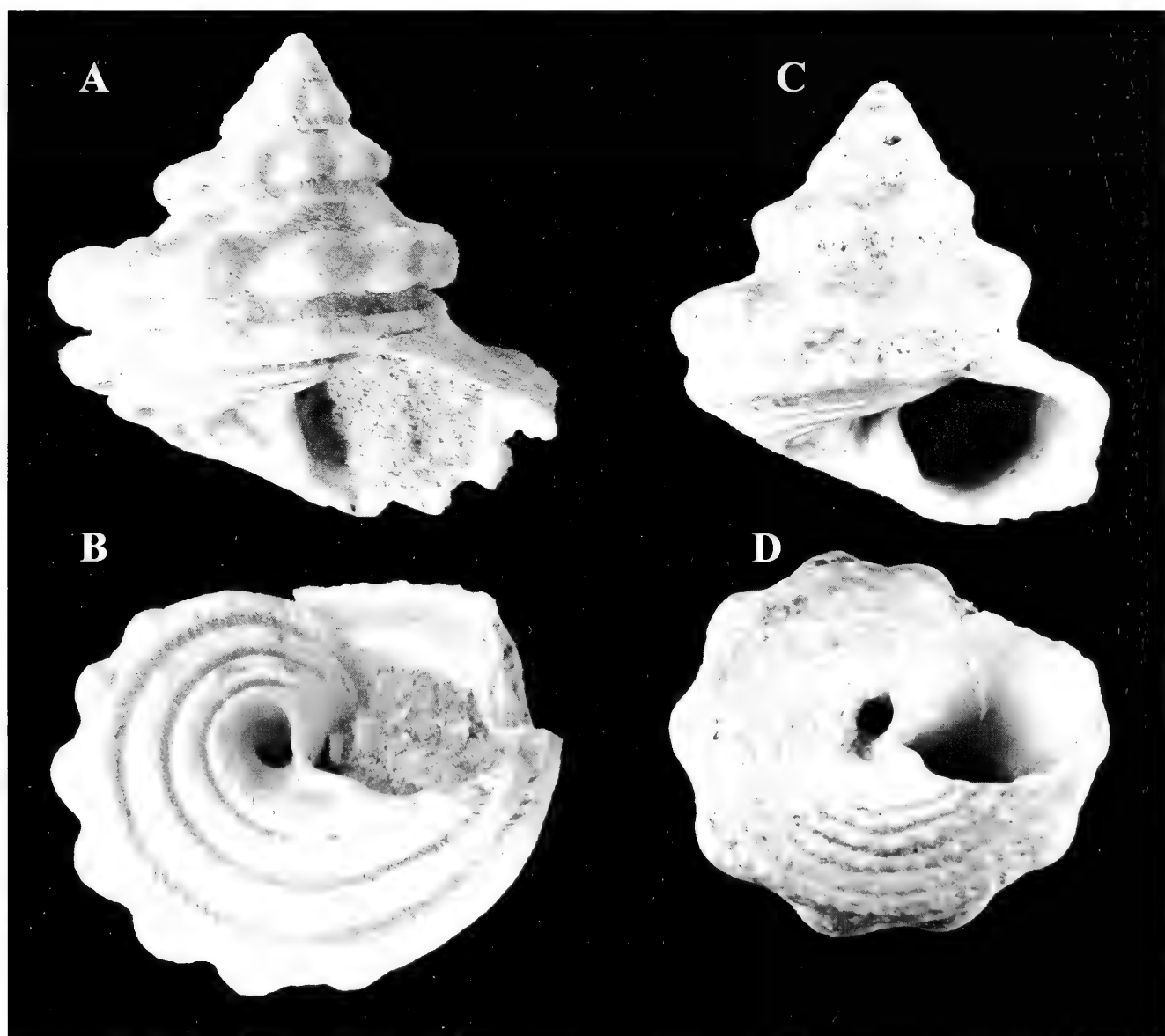
### Material examined

Conicchio (5 exx.), Guistrigona (2 exx.), Terre Rosse (26 exx.), Poggio alla Staffa (13 exx.), Poggio Rotondo (6 exx.), Villa Tosoni (7 exx.).

### Remarks

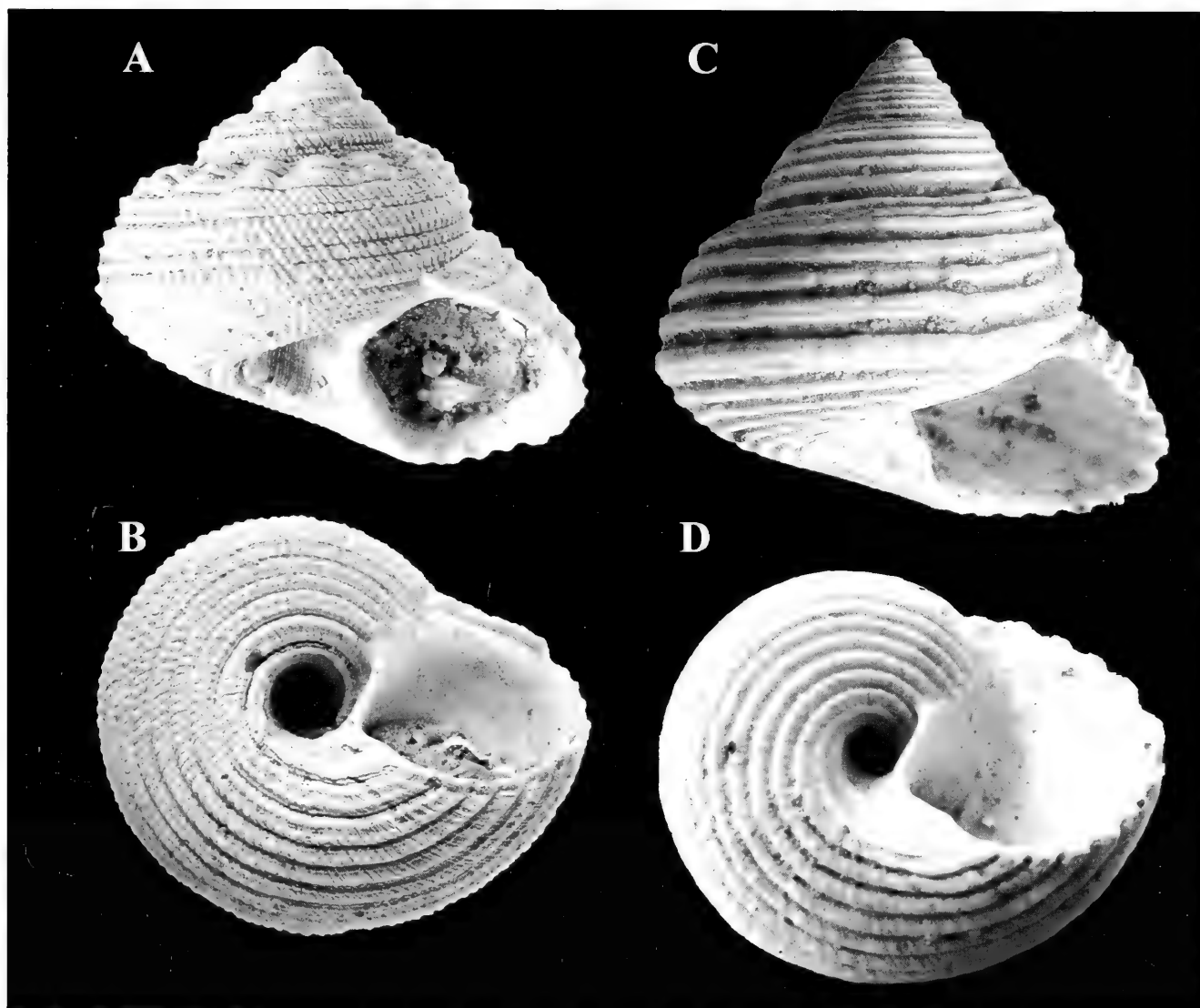
This species is well represented from the Pliocene of Siena. The presence of *G. fanulum* from the Italian Miocene has to be verified, because it was probably confused with similar entities, one of which could be *Gibbula buchi* (Dubois de Montperreux, 1831).

Stratigraphic distribution - Pliocene: Estepona, Spain (Landau, Marquet & Grigis, 2003); Fekih (1975); (Sacco, 1896, Glibert, 1962; Malatesta, 1974; Spadini, 1986, 1987;



**Fig. 5.** Subgenus *Forskalela* Iredale, 1918. **A, B.** *Gibbula (Forskalela) cingulifera* Bronn, 1831; Piacenzian of Terre Rosse. H = 15.3 mm. **C, D.** *Gibbula (Forskalela) fanulum* Linnaeus, 1758; Piacenzian of Terre Rosse. H = 9.4 mm.

**Fig. 5.** Sottogenere *Forskalela* Iredale, 1918. **A, B.** *Gibbula (Forskalela) cingulifera* Bronn, 1831; Piacenziano di Terre Rosse. H = 15,3 mm. **C, D** *Gibbula (Forskalela) fanulum* Linnaeus, 1758; Piacenziano di Terre Rosse. H = 9,4 mm.



**Fig 4.** Subgenus *Gibbula* s.s. **A, B.** *Gibbula (Gibbula) spadinii* Landau, Marquet & Grigis, 2003; Piacentian of Terre Rosse. H = 12.6 mm. **C, D.** *Gibbula (Gibbula) saeniensis* Chirli & Micali, 2001; Piacentian of Terre Rosse. H = 20.3 mm

**Fig 4.** Sottogenere *Gibbula* s.s. **A, B.** *Gibbula (Gibbula) spadinii* Landau, Marquet & Grigis, 2003; H = 12,6 mm. Piacenziano di Terre Rosse. **C, D.** *Gibbula (Gibbula) saeniensis* Chirli & Micali, 2001; Piacenziano Terre Rosse. H = 20,3 mm

sculpture consisting of nodules or folds, more evident at periphery. Convex base, subquadrangular aperture, small umbilicus, convex or straight columella with tooth. Columellar callus partially covering umbilicus.

## Remarks

The species of this subgenus have sometimes been included in *Gibbula* s.s. (Glibert, 1962; Beck, 1995) but *Forskakalena* differ from *Gibbula* s.s. by virtue of peripheral folds or tubercles, a narrow umbilicus and subquadrangular aperture.

In the Pliocene, this group shows significant modifications that in some cases have been interpreted as intra-specific variations of *Gibbula fanulum*, a very polymorphic species.

***Gibbula (Forskakalena) cingulifera*** (Bronn, 1831)  
(Figs 1. C; 5. A, B)

*Gibbula* (s.s.) *fanulum cinguliferum* - Glibert, 1962: 40.

*Gibbula fanulum* - Spadini, 1987: 430-432, fig. 3.

*Gibbula fanulum* - Pracchia, 1997: 19-20, fig. 1.

## Material examined

Conicchio (1 ex.), Guistrigona (1 ex.), Pietrafitta (2 exx.), Poggio Rotondo (2 exx.), Terre Rosse (4 exx.), Villa Tosoni (1 ex.).

## Remarks

*Gibbula cingulifera* differs from *G. fanulum* by virtue of slightly larger dimensions, more accentuated nodulosity, a sharply concave shoulder in the penultimate or ultimate whorl, strong basal cords, limited to three in the Sienese specimens. For these reasons and the fact that no individuals with intermediate characteristics have been found, it is necessary to separate it from *G. fanulum*.

Pracchia (1998) analyses the Tuscan populations of *G. fanulum* and *G. cingulifera*, considering them echo-phe-



Spiral sculpture of the first teleoconch whorls consists of fine cords, intersected by growth lamellae. Wide sulcus with prosocline pliculae and very large cord in abapical position. Axial folds in adapical position, barely evident, visible only in some specimens. Ornamentation of adult whorl consists of subtle spiral cord, partly obliterated, crossed by weakly prosocline axial lamellae. Last whorl clearly angular, keeled. Base slightly convex, with about 15 fine cords and rare growth lines; umbilicus moderately wide and very deep, with evident sulcus and clearly keeled. Columellar callus not covering umbilicus.

Columella oblique and very angled. Aperture subquad-rangular, oblique lip. Colour pattern of alternating axial bands, light and dark, visible mostly in the first whorls.

### Type material

Holotype: MUSNAF/GEO n. 9212.

### Dimension

Holotype: H = 10.2; D = 9.6.

### Derivatio nominis

After Francesco Pizzolato, passionate scholar of palae-ontology.

### Type locality

Conicchio (Cetona).

### Remarks

*Gibbula pizzolatoi* n. sp. is a relatively invariable species distinguished from other species of *Gibbula* by its very conical shape. The furrow, with prosocline pliculae, and the abapical undulations, though not very marked, allow this species to be included in the nominal sub-genus.

### *Gibbula (Gibbula) spadinii*

Landau, Marquet & Grigis, 2003

(Fig. 4. A, B)

*Gibbula (Gibbula) semirotonda* - Spadini, 1986: 87, pl. 1 figs. 1, 2.

*Gibbula (Gibbula) spadinii* - Landau, Marquet & Grigis, 2003: 47, pl. 10, fig. 5.

*Gibbula semirotonda* - Chirli, 2004: 61-62, pl. 22, fig. 4-7.

### Material examined

Conicchio (5 exx.), Podere Pian del Bullettino (1 ex.); Terre Rosse (9 exx., CVS).

### Remarks

Direct comparison of specimens from the Pliocene of Siena and of Spain confirm that they are the same species (Landau, Marquet & Grigis, 2003).

*G. spadinii* differs from *G. semirotonda* by virtue of more canaliculate sutures and slightly narrower umbilicus, and lack of strong deep spiral grooves and umbilical callus. It also differs from *G. pliosubcincta* by virtue of subsutural folds and lack of spiral grooves.

The ornamentation of *G. spadinii*, consisting of spiral cords intersected by growth streaks, makes the surface of the shell unique and unmistakable.

### Stratigraphic distribution

Pliocene: Spain (Landau Marquet & Grigis, 2003), Siena (Spadini, 1986; Chirli, 2004).

### *Gibbula (Gibbula) saeniensis*

Chirli & Micali, 2001

(Figs 1. B; 4. C, D)

*Gibbula (Gibbula) saeniensis* - Chirli & Micali, 2001: 225-228, figs. 1-8.

*Gibbula (Gibbula) saeniensis* - Chirli, 2004: 60-61, pl. 21, fig. 9-12; pl. 22, fig. 1-3.

### Material

Pietrafitta (2 exx.), S. Gimignano (3 exx.), Cava delle Piaggiole (2. exx.), Poggibonsi (1 exx.), Poggio alla Staffa (4 exx.), Terre Rosse (12 exx.), Torrita di Siena (7 exx.).

### Remarks

The species varies in number of cords and h/D ratio, but is readily identified by its particular spiral ornamentation that diversifies it from all other species of *Gibbula*. The specimens from the Siena Basin show greater regularity in the number and consistency of cords, while those from the Val d'Elsa Basin have less regular ornamentation.

Pantanelli (1880) reports *T. succintus* from Pietrafitta, probably referring to this species.

### Distribution

At the current state of knowledge, it seems that *G. saeniensis* is an endemite of the Middle Pliocene of Siena.

### Subgenus *Forskaleina* Iredale, 1918

### Type species

*Trochus fanulum* Gmelin in Linnaeus, 1791 by original designation.

Main synonyms - *Forskalia* H. & A. Adams, 1854, non Koelliker, 1853.

### Diagnosis

Mollusc with small shell, conical scalate spire. First whorls of teleoconch flat or slightly convex, with evident spiral cords and prosocline growth lamellae. Axial

Material examined

Conicchio (6 exx.).

Remarks

This species is apparently similar to *G. magus*, from which it is distinguished by smaller dimension, rounded last whorl and deep furrows. A very similar species is *Magulus pliosubcinctus* Sacco, 1896, which however lacks sub-sutural undulations. Its deep furrows distinguish it from *G. spadinii*.

Stratigraphic distribution

Pliocene: Piedmont (Sacco, 1896), Siena (Chirli, 2004).

*Gibbula pizzolatoi* n. sp.  
(Fig. 3. A-D)

*Gibbula (Forskalea) depressula* - Chirli, 2004: 69, pl. 27 figs. 11-12, pl. 28 figs. 1-6

Material

Poggio Rotondo and Conicchio (12 exx.).

Diagnosis

Small conical shell, first whorls with three cords, last whorl flat, convex base, toothed columella, sharp umbilicus, aperture subquadrangular.

Description

Shell average for genus, very conical (apical angle  $\approx 70^\circ$ ), slightly scalate, solid, with flat or slightly convex base, and protoconch consisting of about one whorl. Teleoconch consisting of about six flat or slightly convex whorls, separated by faint sutures.

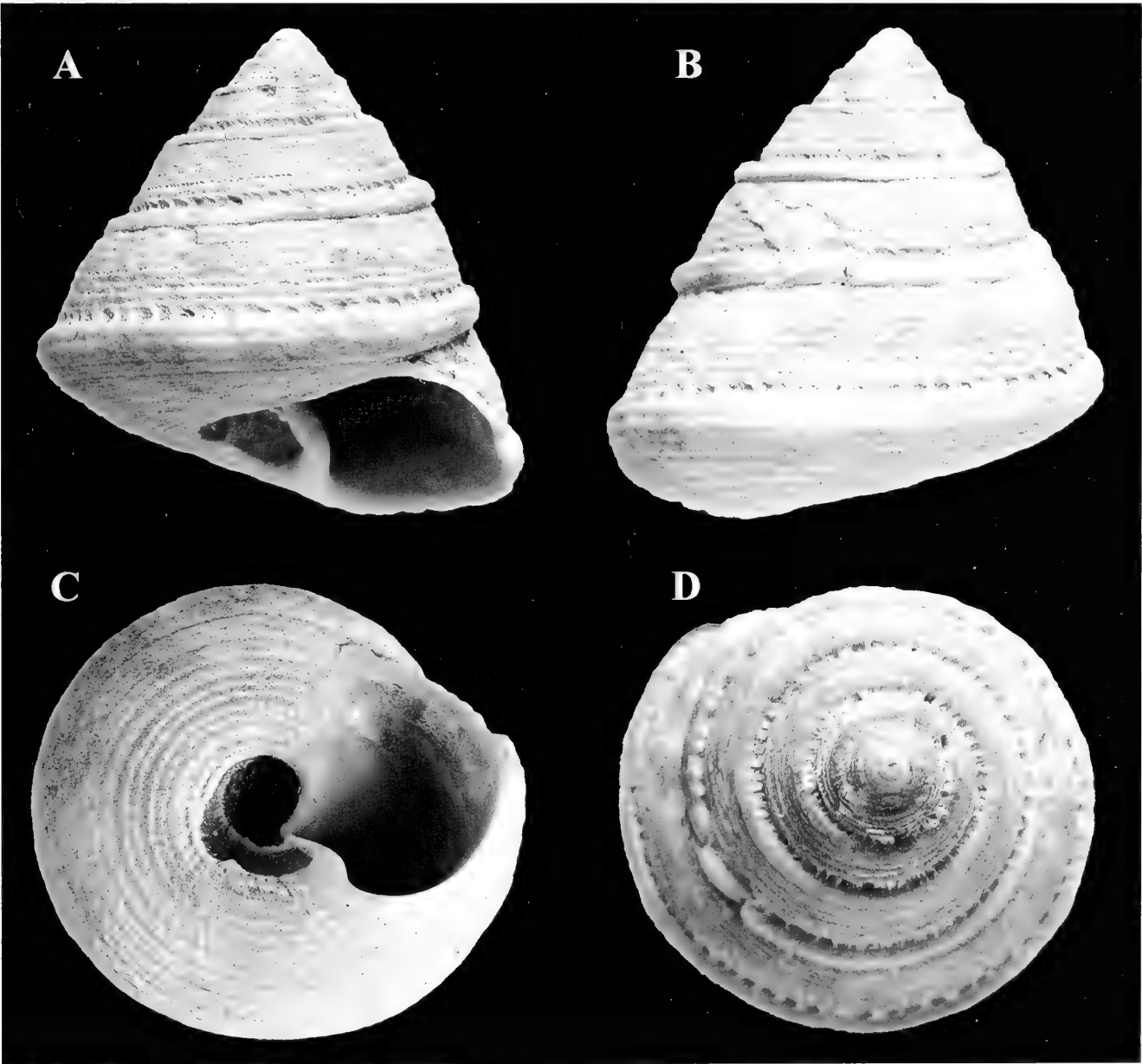


Fig. 3. Subgenus *Gibbula* s.s. A-D. *Gibbula (Gibbula) pizzolatoi* n. sp. Holotype, MUSNAF/Geo n. 7212. Piacentian of Conicchio. H = 10.2 mm.

Fig. 3. Sottogenere *Gibbula* s.s. A-D. *Gibbula (Gibbula) pizzolatoi* n. sp. Olotipo, MUSNAF/Geo n. 7212. Piacenziano di Conicchio. H = 10,2 mm

The genus *Gibbula* Risso, 1826 (Trochidae: Cantharidinae) from the Pliocene of Siena

## Material examined

Poggio Rotondo (124 exx.), Guistrigona (1 ex.), Poggi Gialli (4 exx.), Terre Rosse (12 exx.).

## Remarks

*G. magus* is the most common fossil *Gibbula* from the Pliocene and Pleistocene. This is the species of Mediterranean *Gibbula* that reached the greatest depths, as it does today.

In the Miocene of the northern European basins, we have *G. sagus* (Defrance, 1828) which according to Gilbert (1949) is an intermediate form between *G. magus* and *G. fanulum*. *G. sallomacensis* Cossman & Peyrot, 1919 from the "Elveziano" of Salles (Largileyre) is very similar to *G. magus*, differing only in minor details.

## Stratigraphic distribution

The reports from the Miocene are dubious. Sacco's (1896) reports from the "Elveziano dei Colli Torinesi" are represented by "an incomplete specimen".

Pliocene: Spain (Almera & Bofill, 1898; Landau, Mar-

quet & Grigis, 2003); Piedmont and Liguria (Sacco, 1896; Benigni & Corselli, 1982; Cavallo & Repetto, 1992), Emilia (Cocconi, 1873; Ruggieri, 1949; Borghi & Vecchi, 1999), Calabria and Sicily (Seguenza, 1873-77), Tuscany (De Stefani & Pantanelli, 1879; Spadini, 1986; Forli et al., 1999; Chirli 2004); Emilia (Caprotti, 1974), Modena area (Coppi, 1881), Umbria (Malatesta, 1974). Pleistocene: Southern Italy (Gignoux, 1913), Lazio (Cerulli Irelli, 1916), Grammichele, Sicily (Malatesta, 1960), Tuscany (Menesini & Ughi, 1983).

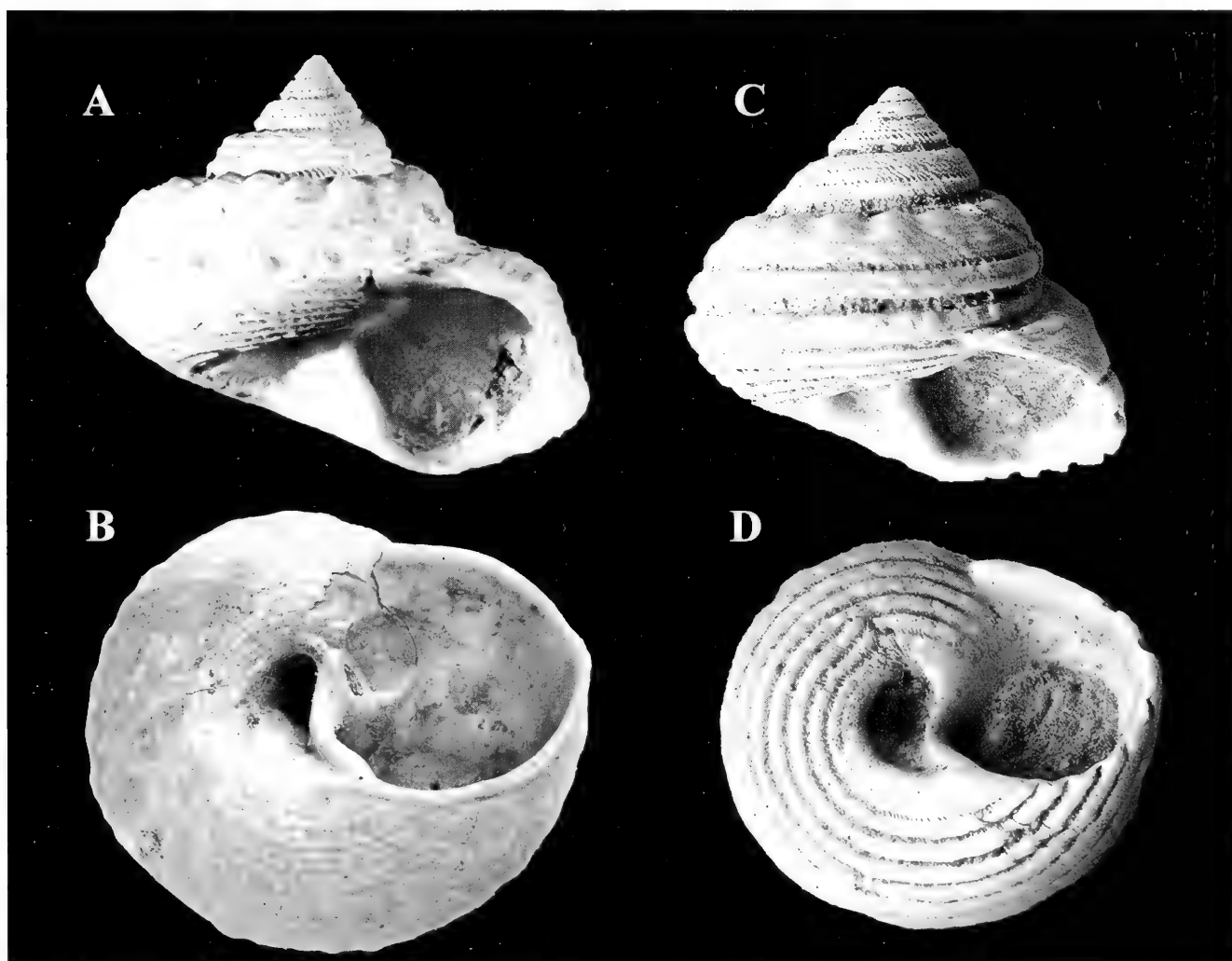
## Geographical distribution

A common species, widespread in the Mediterranean and Atlantic (Ghisotti & Melone, 1972; Fretter & Graham, 1977; Poppe & Goto, 1992).

## *Gibbula (Gibbula) semirotunda* Sacco, 1896 (Fig. 2. C, D)

*Gibbula semirotunda* - Merlino & Campanino, 2001: 52, tav 1, fig 15 a, b, c.

*Gibbula semirotunda* - Ragaini & Bernieri, 2007: 149-151, fig. 3a-c.



**Fig. 2.** Subgenus *Gibbula* s.s. **A, B.** *Gibbula (Gibbula) magus* Linnaeus, 1758; Piacentian of Poggio Rotondo. H = 19.6 mm. **C, D.** *Gibbula (Gibbula) semirotunda* Sacco, 1896; Piacentian of Conicchio. H = 10.7 mm.

**Fig. 2.** Sottogenere *Gibbula* s.s. **A, B.** *Gibbula (Gibbula) magus* Linnaeus, 1758; Piacenziano di Poggio Rotondo. H = 19,6 mm. **C, D.** *Gibbula (Gibbula) semirotunda* Sacco, 1896; Piacenziano di Conicchio. H = 10,7 mm

## Diagnosis

Small to medium-sized shell, caeloconoid to conical, turriculate, shouldered, generally with flat or convex whorls, rounded or angular at the periphery, with more or less thin, never granular, spiral cords. Protoconch smooth, consisting of about one whorl. First three or four teleoconch whorls generally with four cords, a stronger, more robust fifth cord, and a wide deep abapical groove, containing more or less evident prosocline growth lamellae. Horizontal adapical ramp with or without undulation or fold. Wide umbilicus, sometimes bordered by a cord and internally grooved. Aperture simple, columella curved or straight, sometimes toothed or dilated, with inclined outer lip. Colour pattern generally consisting of alternating light and dark, or reddish vertical stripes.

## Remarks

The morphological pattern common to all species of the genus *Gibbula* consists in ornamentation of the first three or four whorls, generally with four or five cords and adapical furrows, usually present until the last whorl.

This pattern occurs in *G. magus*, and also in *G. ardens* and *G. fanulum*, types species of the subgenera *Magulus* and *Forskalea*, respectively. Different morphological development is evident in these three groups:

1) *Gibbula* s.s. Deep suture, canaliculate. A series of abapical undulations (or folds) in the sutural ramp, characteristic of the type species, start from the fifth-sixth whorl.

2) *Magulus*. Deep suture, sutural ramp devoid of undulations (or folds). Whorl surfaces adorned with numerous cords, some very evident, none clearly prominent with respect to the others. Base, columella and aperture similar to those of the previous group.

This second group could be distinguished by lack of the typical undulations (or folds), but the typical sculpture of the first whorls and the columellar and aperture characters allow its coexistence with the *Gibbula magus* group.

3) *Forskalea*. Linear suture, not canaliculate. A series of peripheral or adapical axial folds or nodules (or tubercles) start from the sixth whorl. The umbilicus is medium sized and the columella slightly dilated centrally. The species in this group tend to have simpler ornamentation.

*G. argentaria* Mayer, 1874, some fragments of a doubtful specimen of which were found in the clays of I Sodi, and *G. divergens* Sacco, 1896, a specimen of which has been reported from the Pliocene of Poggio alla Staffa (Chirli, 2004), are not considered in this note. The others species, with the exception of the one proposed as new, are well known and the description is therefore omitted, focusing only on some considerations and comments.

## Abbreviations and acronyms:

D = diameter;

H = height;

H/D = ratio of height to diameter;

MPE = Museo Paleontologico di Empoli;

MUSNAF = Museo di Storia Naturale dell'Accademia dei Fisiocritici, Siena.

## Systematics

Order Vetigastropoda Salvini-Plawen  
& Haszprunar, 1987

Family Trochidae Rafinesque, 1815  
Genus *Gibbula* Risso, 1826

### *Gibbula (Gibbula) magus* (Linnaeus, 1758) (Figs 1. A; 2. A, B)

*Gibbula magus* - De Stefani & Pantanelli, 1879: 78-79.

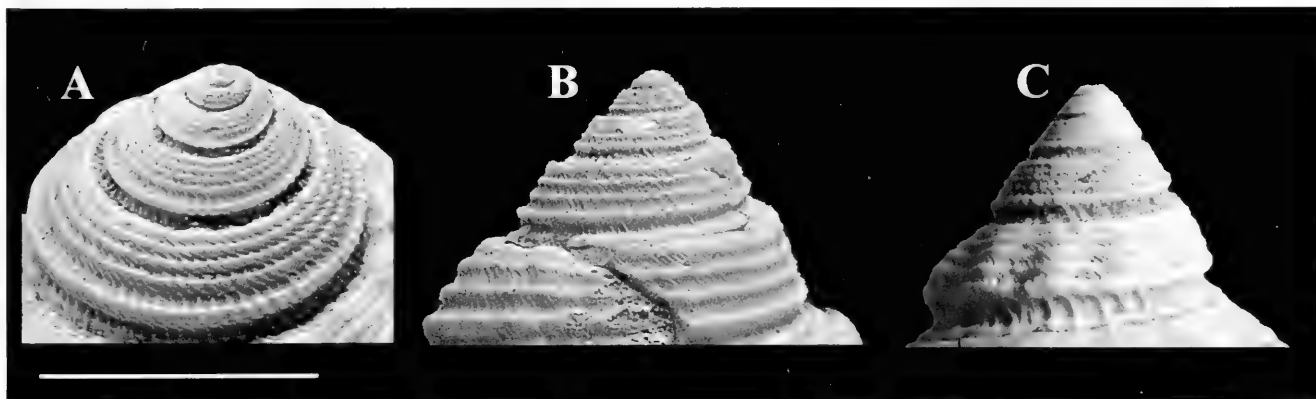
*Gibbula* (s.s.) *magus* - Glibert, 1962: 40.

*Gibbula (Gibbula) magus* - Malatesta, 1972 4: 164, pl. 13, fig. 1.

*Gibbula magus* - Spadini, 1986: 86.

*Gibbula (Gibbula) magus* - Landau, Marquet & Grigis, 203: 46-47, pl. 10, fig. 4.

*Gibbula (Gibbula) magus* - Chirli, 2004: 58-60, pl. 20, fig. 11-12, pl. 21, fig. 1-3.



**Fig. 1.** First teleoconch whorls of some species of *Gibbula*. **A.** *Gibbula (Gibbula) magus* Linnaeus, 1758, Piacentian of Poggio Rotondo. **B.** *Gibbula (Gibbula) saeniensis* Chirli e Micali, 2001 Piacentian of Terre Rosse. **C.** *Gibbula (Forskalea) cingulifera* Piacentian of Terre Rosse. Scale bar = 3 mm.

**Fig. 1.** Primi giri di teleoconca di alcune specie di *Gibbula*. **A.** *Gibbula (Gibbula) magus* Linnaeus, 1758, Piacenziano di Poggio Rotondo. **B.** *Gibbula (Gibbula) saeniensis* Chirli e Micali, Piacenziano di Terre Rosse. **C.** *Gibbula (Forskalea) cingulifera* Piacenziano di Terre Rosse. Unità di misura = 3 mm.

# The genus *Gibbula* Risso, 1826 (Trochidae: Cantharidinae) from the Pliocene of Siena

Valeriano Spadini\*

\*Via Augusto Toti, 52046  
Lucignani (AR), Italy,  
spadiniv@inwind.it

## Abstract

This study concerns species of *Gibbula* recovered from Pliocene deposits near Siena. Four species belonging to the nominate subgenus (*magus*, *saeniensis*, *semirotunda*, *spadini*) and four species belonging to the subgenus *Forskalea* (*cingulifera*, *depressula*, *fanulum*, *guttadauri*) are described and figured. One species, *Gibbula* (*Gibbula*) *pizzolatoi* n. sp. is proposed as a new species.

## Key words

Trochidae, genus *Gibbula*, *Gibbula pizzolatoi* n. sp. Pliocene of Siena.

## Riassunto

[Il genere *Gibbula* Risso, 1826 (Trochidae, Cantharidinae) nel Pliocene senese]. In questo studio vengono documentate le specie di *Gibbula* del Pliocene senese. Quattro specie appartenenti al sottogenere nominale (*magus*, *saeniensis*, *semirotunda*, *spadini*) e quattro specie appartenenti a *Gibbula* (*Forskalea*) (*cingulifera*, *fanulum*, *depressula*, *guttadauri*) vengono commentate e figurate. Una specie, *Gibbula* (*Gibbula*) *pizzolatoi* n. sp. è proposta come nuova per la scienza.

## Parole chiave

Trochidae, genere *Gibbula*, *Gibbula pizzolatoi* n. sp. Pliocene senese.

## Introduction

The genus *Gibbula* Risso, 1826 (type species *Trochus magus* Linnaeus, 1758) is a significant component of the littoral malacofauna. It is widespread along the Atlantic coasts of Europe and Africa and in the Indo-Pacific. Twenty-four species currently live in the Mediterranean Sea (Sabelli et al., 1990) and a similar number of species lived in the same area during the Pliocene (Spadini, 1986, 1987; Landau et al., 2003; Chirli, 2004).

The many extant and fossil species assigned to this genus have been divided into various subgenera: *Gibbula* s.s. (type species *Trochus magus* Linnaeus, 1758), *Colliculus* Monterosato, 1888 (type species *Trochus adansonii* Payraudeau, 1826), *Forskalea* Iredale, 1918 (type species *Trochus fanulum* Gmelin, 1791), *Gibbulastra* Monterosato, 1888 (type species *Trochus divaricatus* Linnaeus, 1758), *Glomulus* Monterosato, 1888 (type species *Trochus turbinoides* Deshayes, 1835), *Magulus* Monterosato, 1888 (type species *Trochus ardens* von Salis, 1793), *Phorculellus* Sacco, 1896 (type species *Trochus varius* Linnaeus, 1758), *Pseudodiloma* Cossmann, 1818 (type species *Trochus mirabilis* Deshayes, 1836 of Eocene of Paris Basin), *Steromphala* Leach in Gray, 1847 (type species *Trochus cinerarius* Linnaeus, 1758), and *Tumulus* Monterosato, 1888 (type species *Trochus umbilicaris* Linnaeus, 1758). *Phorcus* Risso, 1826 (type species *Phorcus margaritaceus* Risso, 1826 = *Monodonta richardi* Payraudeau, 1826) was regarded as a subgenus of *Gibbula* until Gofas & Jabaud (1997) restored its generic rank.

based on macroscopic shell morphology, but genetic data has shown that the identification and delimitation of species on the basis of shell morphology is seldom sufficient. Nevertheless in palaeontology, shell characters remain the most direct way to identify species in the field. Recent studies have examined the species of the genus *Gibbula* using DNA-barcoding and geometric morphometric data (Barco et al., 2013; Uribe et al., 2017; Affenzeller et al., 2017). In these studies, the *Gibbula* complex is recovered as a paraphyletic group and thus use of the name *Gibbula* is restricted to the clade encompassing the type species *Gibbula magus* (Linnaeus, 1758). The other species, traditionally arranged in the subgenera *Colliculus*, *Phorculellus*, *Steromphala*, *Tumulus* etc. must be unified in one or two groups. Affenzeller et al. (2017) propose that *Steromphalus* P. Fischer, 1875 (type species *Trochus cinerarius* Linnaeus, 1758) = *Steromphala* Gray, 1847 (type species *Trochus cinerarius* Linnaeus, 1758) be elevated to the rank of genus.

Here we examine the fossil species of the genus *Gibbula* with particular regard to the Sienese Pliocene records, describing a new species. All these species share a very similar first teleoconch whorl micromorphology that differs from that of the other species (subgenera *Colliculus*, *Phorculellus*, *Steromphala* and *Tumulus*), in line with the genetic results of Barco et al. (2013), Uribe et al. (2017) and Affenzeller et al. (2017).

Genus *Gibbula* Risso, 1826

Type species *Gibbula magus* Linnaeus, 1758

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on atlantid shells (e.g. **Fig. 1. C, D**), and previously depicted by van der Spoel (1976), represent growth lines, where shell growth stops during periods of rest. Between these growth lines, the growth bands represent an increment of one day of shell growth (hereafter described as growth bands). Wall-Palmer et al. (2020) recently carried out the first growth rate experiments on atlantids, using the temperate species *Atlanta ariejansseni* Wall-Palmer et al. 2016. In ambient conditions, *A. ariejansseni* was found to only calcify at the apertural edge, with the shell extending by 25–99 µm per day, depending on the size of the specimen, and the abundance of food. This daily extension is of a similar length to the growth bands observed within our study. On the specimens examined, the growth bands are not always of equal size (**Fig. 1**), and this is likely caused by variations in feeding success and season. Several species of the holoplanktonic shelled pteropods exhibit similar transverse growth lines and bands, for example, *Styliola subula* (Quoy and Gaimard, 1827).

### Structural wavy patterns

The shells of some larger atlantid species present a slightly different type of transverse pattern that is more topographical, giving the appearance of a wavy structure (**Fig. 1. A, B, E**). It is unclear whether this structure is related to growth bands. We observe that it is only present in larger atlantid species that often have a thinner shell, such as *Atlanta gibbosa* and *Atlanta fragilis*. We therefore presume that this may be a structural feature for strengthening the shell. Shells of the family Carinariidae also have this wavy structure.

### Dark-light striped patterns

Atlantid growth lines and growth bands are relatively difficult to see using light microscopy in specimens that still contain soft tissues, because the fresh shells are so transparent (e.g. **Fig. 1. M**). In shells collected from recent sediments, or specimens that have been stored for a long time in alcohol, the growth bands become more visible, taking on a dark-light striped appearance. This is most likely due to slight diagenesis of the shell, probably caused by increased acidity, which causes atlantid shells to become opaque. The stripes are, therefore, not dark-light, but in fact transparent-opaque (**Fig. 1. G–J**).

The transparent-opaque stripes reveal a consistent variation in the susceptibility of the shell to degradation across each growth band, suggesting that the shell structure or thickness is not uniform across each growth band. On transparent-opaque striped shells, the same pattern of variable degradation is repeated in each growth band. The mechanisms of atlantid calcification and, therefore, the cause of this variable susceptibility to degradation is not known. Further investigation of the micro-structure of atlantid shells would be beneficial to understand this.

### Potential uses

The variety of transverse patterns observed on atlantid shells are most likely linked to growth increments, represented by growth lines and growth bands. Evidence from previous studies (Wall-Palmer et al. 2018b, 2020) indicates that these growth lines and bands represent consecutive days. Therefore, these patterns could have two important applications.

Firstly, growth lines could be counted, and used to determine the time that it takes for an atlantid to reach an adult size (shell diameter of 1.5–14 mm depending on species), and thus giving some idea of longevity. The life cycle of atlantids is barely known at all. A single atlantid growth study (Wall-Palmer et al., 2020) indicates that *A. ariejansseni* takes ~116 days to grow to adult size (3.5 mm). However, this is for one species only and is largely based on the growth rates of juvenile specimens. Counting growth lines in atlantids could tell us more about the growth rate of atlantids in their natural habitat across all species and across all regions, which could be of interest, for example, in determining the effects of ocean changes on atlantid growth.

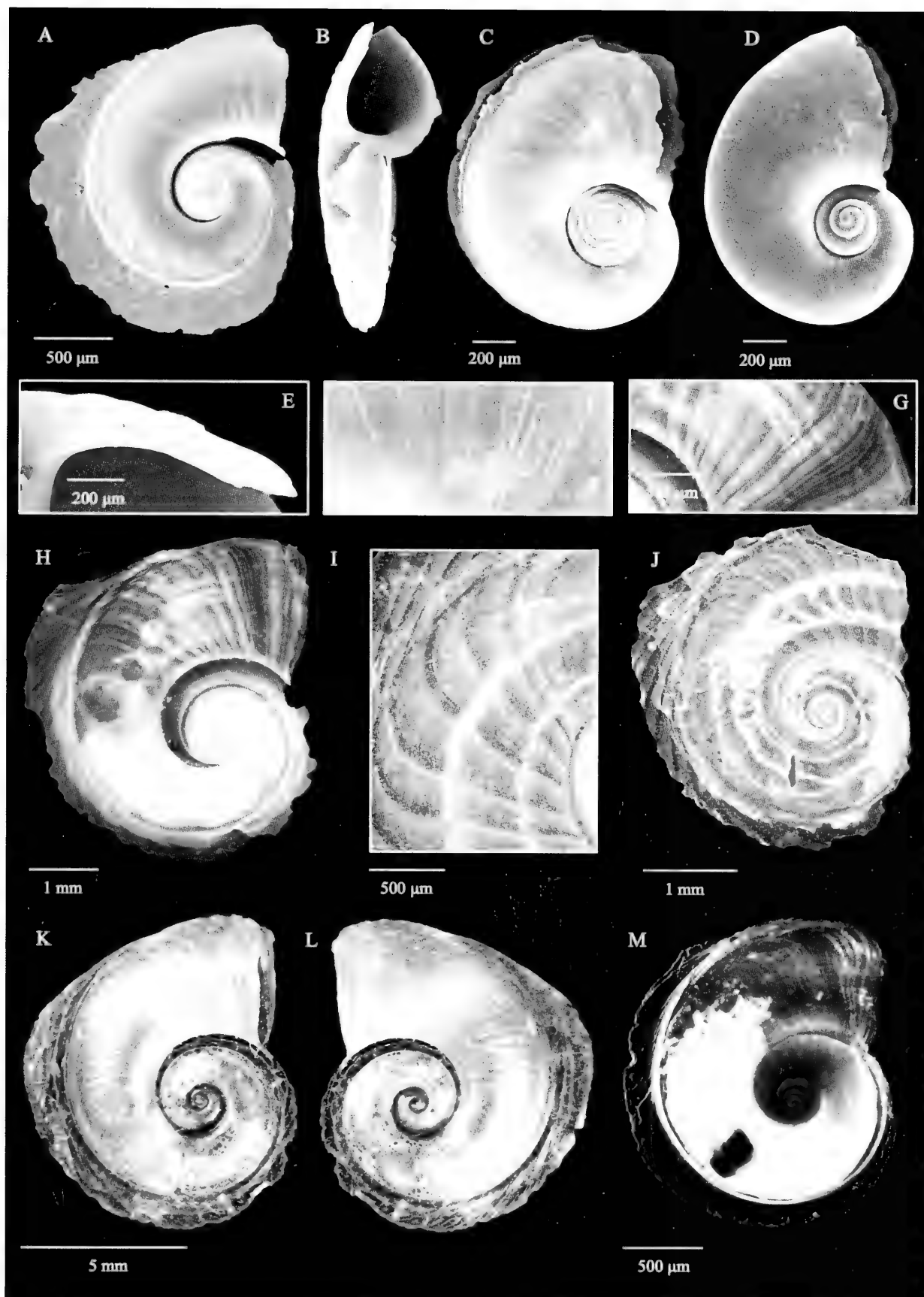
Secondly, atlantids produce their aragonite shell in equilibrium with the water in which they live, so that the composition of the shell reflects ocean geochemistry (Grossman et al., 1986). Therefore, the growth bands of atlantids could be used to extract day-scale geochemistry of the oceans in the region of the DCM. Recent advancements in geochemical analysis now allows the analysis of minute quantities of calcium carbonate (e.g. nanometre-scale secondary ion mass spectrometry and laser ablation ICP-MS). Therefore, atlantid growth bands could present exciting opportunities for monitoring ocean geochemistry, both in the present and on a palaeoceanographic time-scale.

### Acknowledgements

We are grateful to Giada Spaggiardi from Naturalis Biodiversity Center, for imaging the primary specimen of this study. We are also grateful to Tom Schiøtte and Martin Vinther Sørensen from the Natural History Museum of Denmark (NHMD) for access to the Dana collections and to Anders Illum (NHMD) for help with imaging specimens. We would like to thank Harriet Wood from the National Museum of Wales, Cardiff for access to the Melvill-Tomlin collection and for providing images of key specimens. We are grateful to Arie W. Janssen for his thorough review and valuable comments.

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**Fig. 1. A-M.** Examples of transverse patterns on adult atlantid shells. **A, B.** *Atlanta gibbosa* spiral and apertural views. **C.** *A. helicinoidea*. **D.** *Protatlanta souleyeti*. **E.** *A. gibbosa* aperture, showing structural waves in the shell. **F.** *A. helicinoidea* showing multiple lines close together. **G.** *A. fragilis* showing dark-light stripes. **H.** *A. fragilis*. **I, J.** *A. peronii* specimen from the South Ligurian Sea showing dark-light stripes. **K, L.** *A. peronii* spiral and umbilical views. **M.** *A. echinogyra*. For specimen details, see **Tab. 1**. Some images from Wall-Palmer et al. (2018a). Images of *A. peronii* (K, L) © Amgueddfa Cymru-National Museum Wales.

**Fig. 1. A-M.** Esempi di composizione di linee e bande trasversali in esemplari adulti di atlantidi. **A, B.** *Atlanta gibbosa* viste della spira e dell'apertura. **C.** *A. helicinoidea*. **D.** *Protatlanta souleyeti*. **E.** *A. gibbosa* vista dell'apertura in cui sono visibili le ondulazioni strutturali della conchiglia. **F.** *A. helicinoidea* in cui è visibile una serie di bande ravvicinate. **G.** *A. fragilis* in cui sono visibili bande di colore scuro. **H.** *A. fragilis*. **I, J.** *A. peronii* esemplare dal Mar Ligure meridionale in cui sono visibili le bande di colore scuro. **K, L.** *A. peronii* viste della spira e dell'apertura. **M.** *A. echinogyra*. Per dettagli sugli esemplari vedi **Tab. 1**. Alcune immagini da Wall-Palmer et al. (2018a). Foto di *A. peronii* (K, L) © Amgueddfa Cymru-National Museum Wales.

<i>Atlanta peronii</i>	Lesueur, 1817	Atlantic Ocean	-	-	Melville-Tomlin collection, plankton sample	Dry shell, National Museum of Wales, Cardiff. NMW.1955.158.25440
<i>Atlanta peronii</i>	Lesueur, 1817	South Ligurian Sea, Mediterranean Sea	42.99	9.64	Fishing vessel, sediment	Dry shell, RGM.1356394
<i>Atlanta plana</i>	Richter, 1972	Arabian Sea, Indian Ocean	8.02	67.08	Sagar Nidhi 105, 2015, live plankton sample	Shell destroyed for molecular analysis
<i>Atlanta rosea</i>	Gray, 1850	North Atlantic Ocean	30.29	-34.19	Atlantic Meridional Transect, 2010, live plankton sample	Dry shell, author's collection
<i>Atlanta selvagensis</i>	de Vera & Seapy, 2006	North Atlantic Ocean	31.37	-43.18	Dana expedition, 1922, live plankton sample	Dry shell coated for SEM, NHMD-115775
<i>Atlanta tokiokai</i>	van der Spoel & Troost, 1972	West of Madagascar, Indian Ocean	-16.88	42.20	Dana expedition, 1930, live plankton sample	In ethanol, NHMD-115776
<i>Atlanta turriculata</i>	d'Orbigny, 1836	North of Madagascar, Indian Ocean	-12.18	50.30	Dana expedition, 1929, live plankton sample	Dry shell coated for SEM, NHMD-115777
<i>Atlanta vanderspoeli</i>	Wall-Palmer, Hegmann & Peijnenburg, 2019	South Pacific Ocean	-0.30	-99.12	Dana expedition, 1928, live plankton sample	Dry shell coated for SEM, NHMD-232132
<i>Protatlanta sculpta</i>	Issel, 1911	Equatorial Atlantic Ocean	3.93	-12.54	Dana expedition, 1930, live plankton sample	Dry shell coated for SEM, NHMD-115779
<i>Protatlanta souleyeti</i>	(Smith, 1888)	Offshore Montserrat, Caribbean Sea	16.64	-62.65	Caraval cruise, 2002, CAR-MON 2 core, sediment (0.75 mbsf)	Dry shell coated for SEM, author's collection

**Table 1.** Adult atlantid specimens examined for this study that showed clear transverse patterns. Specimens were collected from sediments and live plankton samples from various regions, (mbsf = metres below sea floor, RMNH and RGM = Naturalis Biodiversity Center, NHMD = Natural History Museum of Denmark).

**Tab. 1.** Esemplari adulti di atlantidi esaminati nel presente studio, in cui sono presenti evidenti disegni trasversali a bande. Gli esemplari sono stati raccolti in sedimenti e campioni di plancton vivente, da varie zone, (mbsf = metri sotto il livello del mare, RMNH e RGM = Naturalis Biodiversity Center, NHMD = Natural History Museum della Danimarca).

collected specimens to specimens that have been stored for long periods (up to 98 years) in ethanol. The only atlantid species that was not examined was *Oxygyrus inflatus* Benson 1835. This is because the outer whorl of the adult shell is covered by a conchiolin layer, and any patterns on the shell would not be visible through this layer.

Specimen images were collected in two ways (Fig. 1). Colour images were made using stacking microscopy on a Zeiss Discovery V20 or V12 microscope at the Naturalis Biodiversity Center, Leiden, apart from Fig. 1. K, L, which were photographed at the National Museum of Wales (photo courtesy of Harriet Wood). Scanning Electron Microscopy (SEM) images were produced either at the University of Plymouth (Wall-Palmer et al., 2014), or the Natural History Museum of Denmark (Wall-Palmer et al. 2018a).

Results and Discussion

Transverse patterns were observed on the shells of all

23 atlantid species examined, demonstrating that the patterns are not a feature exclusive to a single atlantid species (Fig. 1). However, the shape, size and visibility of the transverse patterns did vary across the different species and between specimens that were collected and stored in different ways. Transverse patterns varied from simple structural lines and bands, to dark-light colour patterns and even structural waves in the shell.

Growth lines and growth bands

While atlantids are known to vertically migrate large distances each day, shell geochemistry suggests that they only calcify their shells in the upper ocean, in particular, close to the Deep Chlorophyll Maximum, DCM (Wall-Palmer et al. 2018b). The calcification of shell close to the DCM is most likely linked to a replete food supply. Atlantids are carnivorous, so they do not feed on the abundant algae in this region, but most likely on the herbivorous zooplankton that gathers there. Therefore, calcification must occur in cycles of production and rest that coincide with migratory patterns. We presume that thin transverse lines observed

for prawns in the south Ligurian Sea (Mediterranean), a shell of *Atlanta peronii* Lesueur, 1817 was found which shows a distinct dark and light transverse striped pattern covering most of the shell and the keel. The authors found this pattern unusual, and no description of such striped atlantid shells have ever been published, although it is noted that transverse lines are often depicted in drawings of atlantids (e.g. van der Spoel, 1976). Upon investigation of other atlantid specimens from various locations, it became apparent that the Ligurian Sea *Atlanta peronii* shell was not alone in possessing transverse patterns. Here we discuss the possible reasons for these patterns, which include transverse lines, bands, waves and stripes, and how they could be utilised to further understand atlantid ecology.

## Material and methods

Transverse patterns on atlantid shells were first observed in an adult specimen of *Atlanta peronii* from the Mediterranean Sea, which is now housed at the Naturalis Biodiversity Center (registration number RGM.1356394). The specimen was collected from muddy surface sediments between Capraia and Capo Corso, in the south Ligurian Sea using a prawn trawling net, fishing at a water depth of around 450-500 m. Additional adult specimens of all atlantid species were examined for this study, which were collected from a variety of locations (Table 1). These specimens originate from sediment samples (dead, empty shells) or live plankton samples. Specimens from plankton samples range from recently

Species	Author	Collecting region	Latitude	Longitude	Collecting details	Specimen storage
<i>Atlanta ariejansseni</i>	Wall-Palmer, Burridge & Peijnenburg, 2016	South Atlantic Ocean	-44.20	-48.95	Atlantic Meridional Transect, 2010, live plankton sample	Dry shell coated for SEM, RMNH.5004156
<i>Atlanta brunnea</i>	Gray, 1850	North of Madagascar, Indian Ocean	-12.18	50.30	Dana expedition, 1929, live plankton sample	Dry shell coated for SEM, NHMD-115759
<i>Atlanta californiensis</i>	Seapy & Richter, 1993	California current	32.77	-119.23	WCOA16 cruise, 2016, live plankton sample	Shell destroyed for molecular analysis
<i>Atlanta echinogyra</i>	Richter, 1972	Arabian Sea, Indian Ocean	8.02	67.08	Sagar Nidhi 105, 2015, live plankton sample	Shell destroyed for molecular analysis
<i>Atlanta fragilis</i>	Richter, 1993	North of Madagascar, Indian Ocean	-11.58	49.75	Dana expedition, 1929, live plankton sample	In ethanol, NHMD-115785
<i>Atlanta frontieri</i>	Richter, 1993	Arabian Sea, Indian Ocean	11.89	66.97	Sagar Nidhi 105, 2015, live plankton sample	Shell destroyed for molecular analysis
<i>Atlanta gaudichaudi</i>	Gray, 1850	East of Sumatra, Indian Ocean	4.68	98.22	Dana expedition, 1929, live plankton sample	Dry shell coated for SEM, NHMD-115763
<i>Atlanta gibbosa</i>	Souleyet, 1852	North of Madagascar, Indian Ocean	-12.15	49.57	Dana expedition, 1929, live plankton sample	Dry shell coated for SEM, NHMD-115764
<i>Atlanta helicinoidea</i>	Gray, 1850	Offshore Montserrat, Caribbean Sea	16.64	-62.65	Caraval cruise, 2002, CAR-MON 2 core, sediment (0.75 mbsf)	Dry shell coated for SEM, author's collection
<i>Atlanta inclinata</i>	Gray, 1850	Eastern Indian Ocean	-5.45	93.83	Dana expedition, 1929, live plankton sample	Dry shell coated for SEM, NHMD-115766
<i>Atlanta inflata</i>	Gray, 1850	Seychelles, Indian Ocean	-3.75	56.55	Dana expedition, 1929, live plankton sample	Dry shell coated for SEM, NHMD-115767
<i>Atlanta lesueurii</i>	Gray, 1850	North of Madagascar, Indian Ocean	-11.58	49.75	Dana expedition, 1929, live plankton sample	Dry shell coated for SEM, NHMD-115768
<i>Atlanta meteori</i>	Richter, 1972	West of Madagascar, Indian Ocean	-16.88	42.20	Dana expedition, 1930, live plankton sample	Dry shell coated for SEM, NHMD-115769
<i>Atlanta oligogyra</i>	Tesch, 1906	Eastern Indian Ocean	-6.02	93.20	Dana expedition, 1929, live plankton sample	Dry shell coated for SEM, NHMD-115771

# The cause of transverse patterns on atlantid shells

Deborah Wall-Palmer\* (✉), Pasquale Micali<sup>#</sup> & Francesco Giusti<sup>°</sup>

\*Plankton Diversity and  
Evolution - Naturalis  
Biodiversity Center, Leiden,  
Netherlands,  
dmwallpalmer@gmail.com,  
(✉) corresponding author

<sup>#</sup>via Papiria 17, 61032  
Fano (PU), Italy,  
lino.micali@virgilio.it

<sup>°</sup>via XXV Aprile 19/E,  
57017 Collesalveti (LI),  
Italy,  
francescoluigi1949@libero.it

## Abstract

Although the holoplanktonic gastropod family Atlantidae are commonly encountered in the zooplankton, we know very little about their shell growth. Here we investigate transverse lines, bands, waves and striped patterns that have been observed on atlantid shells for some time, and even included in specimen drawings, but they have never been described. We examined specimens of 23 atlantid species and found that transverse patterns were present in all species studied. The patterns varied in visibility between species and also between the age and storage method. We conclude that these transverse patterns are most likely linked to day-scale growth increments, and could have applications in monitoring ocean geochemistry, both present and on geological time scales.

## Key Words

Planktonic gastropods, Atlantidae, striped pattern, growth lines

## Riassunto

[Sulla causa delle strutture e disegni trasversali nelle conchiglie degli atlantidi] Sebbene i molluschi oloplanktonici della famiglia Atlantidae sono normalmente presenti nello zooplancton, molto poco si conosce sull'accrescimento della conchiglia. Il presente lavoro tratta delle linee e bande di accrescimento, ondulazioni e disegni trasversali che sono stati osservati più volte sulle conchiglie degli atlantidi ed anche mostrati nei disegni degli esemplari, ma mai descritti. Sono stati esaminati esemplari di 23 specie di atlantidi e si è notato che le strutture e disegni trasversali sono presenti in tutte le specie studiate, differendo in visibilità da specie a specie, ma anche in funzione dell'età e del metodo di conservazione. Si conclude che queste strutture trasversali sono molto probabilmente legate all'accrescimento giornaliero, e potrebbero avere applicazione nel monitoraggio della geochimica degli oceani, sia nel presente che su scala temporale geologica.

## Parole chiave

Gasteropodi planctonici, Atlantidae, bande colorate, linee di accrescimento

## Introduction

The holoplanktonic atlantid gastropods (Pterotracheoidea, Atlantidae) are a common component of the mesozooplankton. They reside in the upper ocean of all tropical-subtropical oceanic regions (Lalli & Gilmer, 1989; Wall-Palmer et al. 2018a, b), sometimes extending into temperate waters (Seapy & Richter, 1993; Wall-Palmer et al. 2016). The atlantids exhibit many adaptations for a planktonic mode of life, including a swimming fin with a sucker that has developed from the foot, relatively large and complex eyes that scan the water for predators and prey, and a long trunk-like proboscis that earns the atlantids the common name 'sea elephant' (Lalli & Gilmer, 1989). Atlantids are selective carnivores, using their proboscis to reach into the shells of their pteropod prey. They are easily distinguished from the other two Pterotracheoidea families (Carianariidae, Pterotracheidae) by their aragonite shell, which is a small (<14 mm) flattened lenticular disk, with a keel that runs around the outer whorl. Atlantids can fully retract into their shell, and seal themselves inside with an operculum. The true importance of the shell was re-

cently discovered by Karakas et al. (2018), who identified it as a swimming appendage, which is used together with the single swimming fin to produce directional propulsion.

Although atlantids rely heavily on their shell, the mechanisms of atlantid shell calcification are poorly known (Batten & Dumont, 1976) and only two studies document the rearing of atlantids under laboratory conditions (Pilkington, 1970; Wall-Palmer et al., 2020). Atlantid shells are generally transparent and largely colourless. Several atlantid species have subtly colourful shells when alive (see images on the website planktonic.org). For example, the species *Atlanta brunnea* is named for its beautiful brown shell, *Atlanta turriculata* often has a purple larval shell, and several species have colouration at the keel base, or the whorl sutures. However, these colours fade and eventually disappear from shells once they become buried in sediments, so that fossil shells (even in relatively recent sediments) are usually colourless, and often opaque from slight shell degradation.

In shell grit obtained in 2019, by a fishing boat trawling

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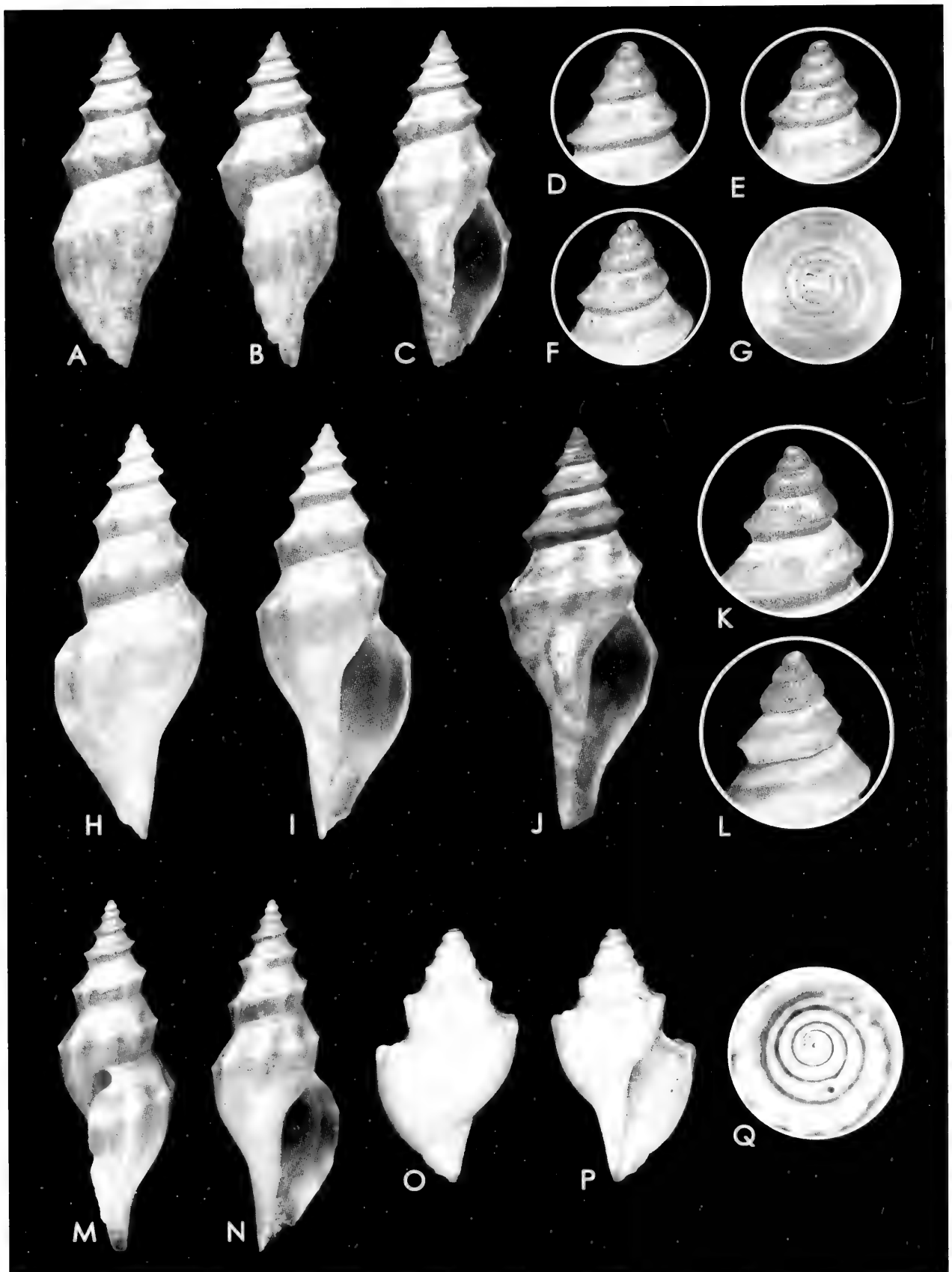
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A new species of the genus *Theta* A. H. Clarke, 1959 (Gastropoda: Raphitomidae) from the Philippines





**Fig. 1.** *Theta baiocchii* n.sp. **A-G. Holotype:** Philippines, Mactan Island, Malingin, trawled at 180-250 m, March 2012, 8.9 mm x 3.2 mm (MNHN-IM-2000-35875); **H, I. Paratype 1:** Philippines, Mactan Island, trawled at 180-230 m, April 2012, 10.9 mm x 3.7 mm (AN); **J-L. Paratype 3:** Philippines, Mactan Island, Punta Engano, trawled at 180-230 m, February 2012, 6.8 mm x 2.4 mm (PB); **M-N. Paratype 2:** Philippines, Mactan Island, Coral Point, trawled at 180-250 m, October 2012, 10 mm x 3.4 mm (DP); **O-Q. Theta lyronuclea** (Clarke, 1959), **Holotype** (MCZ 218184). 31°42'N, 68°08'W, near Bermuda Is., 2843 fathoms (5200 m), 9.1 mm x 5.1 mm, Museum of Comparative Zoology, Harvard University.

**Fig. 1.** *Theta baiocchii* n.sp. **A-G. Olotipo:** Filippine, Isola di Mactan, Malingin, pescata con le reti a 180-250 m nel marzo 2012, 8,9 mm x 3,2 mm (MNHN-IM-2000-35875); **H, I. Paratipo 1:** Filippine, Isola di Mactan, pescata con le reti a 180-230 m nell'aprile 2012, 10,9 mm x 3,7 mm (AN); **J-L. Paratipo 3:** Filippine, Isola di Mactan, Punta Engano, pescata con le reti a 180-230 m nel febbraio 2012, 6,8 mm x 2,4 mm (PB); **M-N. Paratipo 2:** Filippine, Isola di Mactan, Punta Engano, pescata con le reti a 180-250 m in ottobre 2012, mm x 3,4 mm (DP); **O-Q. Theta lyronuclea** (Clarke, 1959), **Olotipo** (MCZ 218184). 31°42'N, 68°08'W, vicino all'Isola di Bermuda, 2843 braccia (5200 m), 9,1 mm x 5,1 mm, Museo di Zoologia Comparata, Università di Harvard.

in the scientific divulgation, mostly in the malacology field.

**Description (in parentheses data of the holotype)**

Shell fusiform, biconical, of medium size for the genus, height 6-11 mm (8.9 mm), width 2-4 mm (3.2 mm). Protoconch multispiral of three convex whorls, height 513 µm, width 498 µm; protoconch I of 0.8 whorls, width 208 µm, with orthogonally cancellate sculpture; protoconch II of 2 whorls, strongly keeled, with a diagonally cancellate sculpture on the lower half of the spire. Teleoconch of 4-5.5 whorls characterized by a distinctly pagoda-shaped outline with sharply keeled whorls and a wide aperture. Spiral sculpture composed by 9-18 very faint spiral cords that gets stronger only in the base and visible only in adult specimens. Axial sculpture of 9-10 strong opisthocline ribs with smooth surface between the axial ribs interspaces. Subsutural ramp wide and flat, concave in the first whorls and almost flat in the last whorls. Columella simple, slightly sinuous anteriorly, gently angled in the upper third. Anterior siphonal canal wide and long, posterior wide and deep. Outer lip smooth. Colour white with brown blotches. Soft parts unknown.

**Distribution**

Known only from the Mactan Island, Philippines.

**Remarks**

Bouchet & Warén (1980) considered *Theta* a genus “which agree rather well with *Gymnobela*, except for having a more polished, greyish semitransparent shell, almost of vitreous structure, instead of a dull, chalky, brownish or porcellaneous structure” and for these reasons they kept separated the two genera. In Bouchet et al. (2011), the genus *Theta* was placed as a subgenus of *Gymnobela* without additional comments about this change.

Sánchez & Pastorino (2020) in their work about the record of *T. lyronuclea* in the Southwestern Atlantic considered the two genus distinct, concluding that “while the necessity of a revision of the latter genus [*Gymnobela*] is clear, the characters studied here for the type species of *Theta* pointed towards a different genus”. Considering these works, the authors of the present article keep separated the two genera and use *Theta* for the new species here described.

*T. baiocchii* (Fig. 1. A-N) is here compared with the three species included in the genus: *T. vayssierei* (Dautzenberg, 1925), which is a deep-water (3070-4706 m) large sized (maximum height 21 mm) species reported only from the type locality and adjacent areas, situated off Portugal coasts. It differs from *T. baiocchii* for the globose shape, the fine and numerous spiral sculpture and the crenulated keel with numerous tubercles. In large

adult specimens like the holotype, the keel disappears and the shape of the shell becomes round. The protoconch in *T. vayssierei* lacks the reticulate sculpture and has only oblique lirae, making it very different from the one of *T. baiocchii*.

*T. lyronuclea* (A. H. Clarke, 1959) (Fig. 1. O-Q), like *T. vayssierei*, is a very deep-water (3064-5300 m) species, of large size (maximum height 27.6 mm) (Sysoev & Bouchet, 2001) and known from the Atlantic Ocean. The type locality is off Bermuda, but the species is reported in the North East Atlantic too (Bouchet & Warén, 1980). The shell is very similar to the one of *T. baiocchii*, sharing a very similar keel. It differs in size, being more than the double than the one of *T. baiocchii*, the totally white surface and the presence of a fine spiral sculpture, that vanishes in the last whorl. The protoconch in *T. lyronuclea* (Fig. 1. Q) differs considerably in sculpture from *T. baiocchii* (Fig. 1. D-G, K, -L), lacking the reticulate sculpture and having only oblique lirae.

*T. chariessa* (R. B. Watson, 1881) was described for the Azores Islands, and later reported for other areas in the North East Atlantic (Bouchet & Warén, 1980). This species is the Atlantic *Theta* with the broadest bathymetric range (400-4300 m) and the largest distribution, ranging from the American to the European coasts, where *T. lyronuclea* lives. The species is quite variable, from broad, thick-shelled specimens with strong sculpture to more thin-shelled, slender and less sculptured specimens. This high variability is the cause of the many synonyms that the species has. The size of the shell can reach the triple of the one of *T. baiocchii*. The shape in some specimens is quite similar to *T. baiocchii*, but it is always less carinated and with more nodules in the keel. The sculpture in *T. chariessa* is composed by numerous and fine spiral cords, in contrast with the smooth surface of *T. baiocchii*, that has spiral sculpture only on the base. The protoconch of *T. chariessa* is very similar to the one of *T. baiocchii*, having diagonally cancellate sculpture on the lower half of the spire.

*T. baiocchii* n.sp. shares the pagoda-shaped outline with *Gymnobela edgariana* (Dall, 1889), but the latter is a big-sized Caribbean species (35-64 mm) with strong and numerous spiral thin cords.

The new species can be compared also with *Isodaphne albolineata* Kilburn, 1977, a South African species which shares a similar shape, but with a secondary strong keel on the base and a fine sculpture of numerous spiral threads. The size is similar, but larger (holotype 17.7 mm).

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# A new species of the genus *Theta* A. H. Clarke, 1959 (Gastropoda: Raphitomidae) from the Philippines

Andrea Nappo\*(✉) & Daniel Pellegrini<sup>#</sup>

\*Via S'Arrulloni 25, 09045  
Quartu Sant'Elena (CA),  
Italy.  
nappo.andrea@gmail.com,  
(✉) corresponding  
author

<sup>#</sup>Via Colle Morello 2,  
00038 Valmontone (RM),  
Italy.  
danielpellegrini@hotmail.it

## Abstract

A new Raphitomid species, assigned to the genus *Theta*, is here described on the basis of morphological features. The new taxon is compared with similar species of the genus *Theta*. The new species is characterized by the carinated shape and the smooth surface and is reported from the Philippines at a depth between 180 m and 250 m.

## Key words

Caenogastropoda, Neogastropoda, Turridae s.l., new species

## Riassunto

Viene descritta una nuova specie della famiglia Raphitomidae, assegnata al genere *Theta*, sulla base dei caratteri morfologici. Il nuovo taxon è confrontato con le specie simili del genere *Theta*. La nuova specie è caratterizzata dal suo profilo carenato e dalla superficie liscia ed è stata rinvenuta nelle Filippine a profondità tra 180 m e 250 m.

## Parole chiave

Caenogastropoda, Neogastropoda, Turridae s.l., nuova specie

## Introduction

According to WoRMS (accessed on 23 August 2020), three recent species (*T. vayssierei*, *T. lyronuclea* and *T. chariessa*) are currently placed in the genus *Theta* A. H. Clarke, 1959, distributed in the Atlantic Ocean. All known species have a planktotrophic larval development, and a medium-sized larval shell with rounded whorls and oblique or cancellate sculpture. In the present work, we describe a species new to science from the Pacific Ocean, characterized by a carinated shape and smooth surface.

## Material and methods

The material was found in shell grit obtained by fishermen operating with trawl nets in the Philippines. All the studied specimens are empty shells without traces of soft parts and they look fresh dead. The World Register of Marine Species (WoRMS) was used for nomenclatural updates. Sizes are taken with a digital caliper, are reported in millimeters and given as shell width × shell height. Photos are obtained with a Nikon D90 with mounted a Nikkor 50 mm 1.8 lens and processed with Adobe Photoshop CC®.

Abbreviations and acronyms: Andrea Nappo private collection (AN); Daniel Pellegrini private collection (DP); Pamela Baiocchi private collection (PB); World Register of Marine Species (WoRMS); Muséum National d'Histoire Naturelle, Paris (MNHN).

## Systematics

Family Raphitomidae Bellardi, 1875  
Genus *Theta* A. H. Clarke, 1959: 234

Type species: *Pleurotomella lyronuclea* A. H. Clarke, 1959 by original designation. (Fig. 1. O-Q)

*Theta baiocchii* n. sp.

## Type material

Holotype: Philippines, Mactan Island, Malingin, trawled at 180-250 m. March 2012. 8.9 mm × 3.2 mm (MNHN-IM-2000-35875) (Fig. 1. A-G). Paratype 1: Philippines, Mactan Island, trawled at 180-230 m. April 2012. 10.9 mm × 3.7 mm (AN) (Fig. 1. H, I). Paratype 2: Philippines, Mactan Island, Coral Point, trawled at 180-250 m. 2012. 10 mm × 3.4 mm (DP) (Fig. 1. M, N). Paratype 3: Philippines, Mactan Island, Punta Engano, trawled at 180-230 m. February 2012. 6.8 mm × 2.4 mm (PB) (Fig. 1. J-L).

## Type locality

Philippines, Mactan Island.

## Etymology

After our friend Pamela Baiocchi, for her contribution

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DW3534 Trawler “Nosy Be 11”, Sainte Luce area, 296-307 m, 24°43’S-47°32’E, 02MAY2010, Expedition ATIMO VATE.

DW3605 SW Cap Sainte Marie, 56-57m, 25°54.5’S – 44°51.0’E, 13MAY2010, “Nosy Be 11” Expedition ATIMO VATAE

DW3606 Trawler “Nosy Be 11”, SW Capo Sainte Marie, 44-46 m, 25°48,4’S-44°51,1’E, 13MAY2010, Expedition ATIMO VATE.

TB02-TB03 Phare Flacourt, rocky bottom with slabs, 18 m, 25°01,3’S-47°00,5’E, 01MAY2010, Expedition ATIMO VATE.

TB07 Plage Libanona, 4-5m, fond rocheux corallien, 25°02.5’S – 46°59.7’E, 09MAY2010, Expedition ATIMO VATAE.

TV07 In front of Phare Flacourt, rocky flaws, Euricides tubes, 12-16 m, 25°01,3’S-47°00,2’E, 02MAY2010, Expedition ATIMO VATE.

### Sulawesi

B244 Corindon, Makassar, 970 m, 00°56’S-119°22’E.

### Tarawa Seamounts

DW3317 Ari’i Moana Mont, 593-668 m, 19°13’S-151°29’W, 25SEP2009, N/O “Alis” Expedition TARASOC.

### Tuamotu

TH02 Hereheretue Atoll, 60 m, 19°52,48’S-145°00,40’W, 28APR2011, Expedition TUAM’2011.

THA01 Hao Atoll, 55 m, 18°03,83’S-140°59,49’W, 04MAY2011, Expedition TUAM’2011.

TTE03 Tematangi Atoll, 60 m, 21°42,59’S-140°34,02’W, 01MAY2011, Expedition TUAM’2011.

TTAK01 Takaroa Atoll, 50 m, 14°27,7’S-145°02,4’W, 15MAY2011, Expedition TUAM’2011.

TTETI01 Tetiaroa Atoll, 70 m, 17°02,26’S-149°33,71’W, 31MAY2011, Expedition TUAM’2011.

### Vanuatu

DB25 10 m, Bruat Channel, N coast of Malo Is., 15°37,7’S-167°11, 3’E, 16SEP2006, Santo Marine Biodiversity Survey.

DW1065 360-419 m, 16°16’S-167°21’E,02OCT1994, N/O”A-lis” Expedition MUSORSTOM 8.

DW1072 622-625 m, 15°40’S-167°20’E, 04OCT1994, N/O”A-lis” Expedition MUSORSTOM 8.

DW1097 281-288 m, 15°05’S-167°11’E, 07OCT1994, N/O”A-lis” Expedition MUSORSTOM 8.

### Western Australia

WA11 Albany, South side Possession Point, King George Sound, 7 m, 35°02,63’S – 117°55,26’E, 27NOV2011.

WA13 Albany, Mistaken Island, King George Sound, 35°03,86’S – 117°56,51’E, 28NOV2011.

WA20 Albany, Seal Is., King George Sound, 4-12 m, 36°04,54’N-117°58,35’E, 30NOV2011.

WA25 Albany, South East corner, Hassel Beach, intertidal, 0-1 m, 34°52,72’S – 118°24,39’E, 01DEC2011.

WB30 Busselton, Cape Naturaliste, Yallingup, 0-1 m, 33°38,5’S-115°01,3’E, 05DEC2011.

WB32 Busselton, Cape Naturaliste, Eagle Bay, 5-15 m, 33°33’S-115°04’E, 05DEC2011.

WE01 Esperance, Rabbit Is., outer edge of Town Jetty, 11 m, 35°16,94’N-124°06,3’E, 25NOV2011.

WE04 Esperance, Woody Is., anchorage at NE corner, 11 m, 33°57,55’N-122°01,25’E, 21NOV2011.

WE09 Esperance, Rabbit Is., South West Side, 12-25 m, 35°54,94’N-121°53,49’E, 25NOV2011.

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- DW1235 Cap N'Doua, 51-52 m, 22°24,1'S-166°55,5'E, 09MAR1993, N/O "Alis" Expedition LAGON.
- DW2049 Banc Jumeau est, 470-621 m, 23°43'S-168°15'E, 24OCT2003, N/O "Alis" Expedition NORFOLK 2.
- DW2084 Ride de Norfolk, Banc Eponge, 586-730 m, 24°52'S-168°22'E, 28OCT2003, N/O "Alis" Expedition NORFOLK 2.
- DW2530 Banc Nova sud, 338-343 m, 22°48'S-159°23'E, 09OCT2005, N/O "Alis" Expedition EBISCO.
- DW2629 S Landsdowne, 569-583 m, 21°06'S-160°46'E, 21OCT2005, N/O "Alis" Expedition EBISCO.
- DW2631 S landsdowne, 372-404 m, 21°03'S-160°44'E, 21OCT2005, N/O "Alis" Expedition EBISCO.
- DW4653 W Ile de Pins, 76 m, 22°31'S-167°03,5'E, 10AUG2016, N/O "Alis" Expedition KANOCONO.
- DW4661 SW Ile de Pins, 405-410 m, 22°48'S-167°07'E, 11AUG2016, N/O "Alis" Expedition KANOCONO.
- DW4698 SW Ile de Pins, 460 m, 22°47'S-167°18'E, 16AUG2016, N/O "Alis" Expedition KANOCONO.
- DW4706 SW Ile de Pins, 343-365 m, 22°47'S-167°24'E, 17AUG2016, N/O "Alis" Expedition KANOCONO.
- DW4708 SW Ile de Pins, 68-71 m, 22°44,7'S-167°21'E, 17AUG2016, N/O "Alis" Expedition KANOCONO.
- DW4720 SW Ile de Pins, 374-400 m, 22°50'S-167°1'E, 19AUG2016, N/O "Alis" Expedition KANOCONO.
- DW5028 Betw. Chesterfield & Bellona Plateau, 420-450 m, 20°21'S-158°40'E, 21SEP2017N/O "Alis" Expedition KANADEEP.

## Papua New Guinea

- KPS09 Boudisson Is., 18-27 m, sediment in ledges reef, 02°41,6'S-150°37,2'E, 19/23DEC2014, Expedition KAVIENG 2014
- DW3719 Vitiaz Strait, 410 m, 06°03'S-147°36'E, 07OCT2010, Expedition BIOPAPUA
- KD10 Kavieng Harbour opposite Main wharf, silty sand, 18 m, 02°35,1'S-150°47,3'E, Expedition KAVIENG 2014
- KM24 New Ireland, Lemus Is. Expedition KAVIENG 2014.

## Philippines

- B31 Panglao Is., Dauis, rubble on sandy bottom and seagrass, 1-2 m, 9°38,7'N-123°50,4'E, 26JUN2004, Panglao Biodiversity Project.
- B35 Panglao Is., N of doljo, reef wall, 31 m, 9°35,9'N-123°44,5'E, 01JUL2004, Panglao Marine Biodiversity Project.
- L46 Balicasag Is., 90-110 m, 9°30,9'N-123°41,2'E, 04JUL2004. Panglao Marine Biodiversity Project.
- L91 Siquijor Is., Sandugan, 40 m, 9°18'N-123°36'E, JUL2008.
- S21 Bohol Is., Manga, reef slope with silt, 4-12 m, 9°41,7'N-123°50,9'E, 20JUN2004, Panglao Marine Biodiversity Project.

## Salomon Sea

- CP2228 Salomon Is., Choiseul, N/O "Alis", 609-625 m, 6°33'S-156°11'E, 28OCT2004. Expedition SALOMON 2.

- DW1745 Salomon Is., N/O "Alis", 253-356 m, 9°23,4'S-159°58,5'E, 25SEP2001. Expedition SALOMON 1.
- DW2257 Vella Gulf, N/O "Alis", 229-236 m, 8°08'S-157°00'E, 03NOV2004. Expedition SALOMON 2.
- DW4285 Budibudi Is., N Archipelago Laughlan, N/O "Alis", 380-411 m, 9°11'S-153°55'E, 30APR2014. Expedition MADEEP.
- DW4287 Budibudi Is., N Archipelago Laughlan, N/O "Alis", 340-375 m, 9°12'S-153°56'E, 30APR2014. Expedition MADEEP.
- DW4300 Siga Is., SE Engeneer group Is., N/O "Alis", sand, 470-526 m, 10°45'S-151°06'E, 02MAY2014. Expedition MADEEP

## Society Island

- DW3429 Huahine, 493-540 m, 16°43'S-150°38'W, 15OCT2009, N/O "Alis" Expedition TARASOC.
- DW3437 Tahaa, 620-700 m, 16°42'S-151°31'W, 17=CT2009, N/O "Alis" Expedition TARASOC.

## South Pacific

- DW601 Wallis and Futuna, N/O "Alis", 350 m, 13°19'S-176°17'W, 25MAY1992. Expedition MURSTOM 7.

## South Africa

- Stn 2 Sodwana Bay, North side, Jesser Canyon top to the right of the cavity "Ucave", 110 m, 09MAY2013.
- Stn 3 Sodwana Bay, North side, Jesser Canyon top to the left of "L'Amphithéâtre", 110 m, 10MAY2013.
- Stn 28 165 m, 35°40'S-21°59'E, VEMA cruise 19, 1963.

## South Madagascar

- BB03 Lavanono area, limestone rock overhang, 14-18 m, 25°26,4'S-44°56,1'E, 29MAY2010, Expedition ATIMO VATE.
- BM12 Faux cap, flat rocks and pools, intertidal, 25°34,3'S-45°31,7'E, 04JUN2010, Expedition ATIMO VATE.
- BS09 Albatros, rocks, 11-13 m, 25°28,8'S-44°56,8'E, 05JUN2010, Expedition ATIMO VATE.
- CP3547 Trawler "Nosy Be 11", S Andavaka Cap, 69-70 m, 25°18,0'S-46°40,3'E, 04MAY2010, Expedition ATIMO VATE.
- CP3549 Trawler "Nosy Be 11", SW Andavaka Cap, 53-54 m, 25°16,9'S-46°31,3'E, 04MAY2010, Expedition ATIMO VATE.
- CP3579 Trawler "Nosy Be 11", S Faux cap, 65-66 m, 25°54,5'S-45°33,2'E, 09MAY2010, Expedition ATIMO VATE.
- CP3615 Trawler "Nosy Be 11", Sainte Marie Cap, 284-286 m, 25°14'S-45°09'E, 14MAY2010, Expedition ATIMO VATE.
- DW3515 Trawler "Nosy Be 11", between Lokaro and Ste Luce, 184-203 m, 24°53'S-47°28'E, 30APR2010, Expedition ATIMO VATE.
- DW3588 Trawler "Nosy Be 11", SW Barrow Point, 113-135 m, 25°03'S-44°00'E, 11MAY2010, Expedition ATIMO VATE.

MD19	Inhaca Is., Machangulo Channel, biotetric sand and dead coral, 15 m, 26°00,5'S-32°48,4'E, 02DEC2011, Expedition INHACA.		
MD23	Inhaca Is., E Xefina Is., biotetric sand, 10-11 m, 26°55,1'S-32°45,2'E, 05DEC2011, Expedition INHACA.		
MD26	Inhaca Is., in front to Ponta Malengane, sand, 75 m, 26°03,6'S-33°01,8'E, 05DEC2011, Expedition INHACA.		
MM2	Inhaca Is., Punduine Point, sand, bowl, dead coral, tide, 26°02,5'S-32°53,5'E, 24NOV2011, Expedition INHACA.		
MM18	Inhaca Is., Cibjane Bank, sand, dead coral blocks, tide, 26°03,5'S-32°52,9'E, 11DEC2011, Expedition INHACA.		
MS1	Inhaca Is., Abril Point, flat rocks, sand and coral, 14 m, 26°06,3'S-32°58,0'E, 26NOV2011, Expedition INHACA.		
MS2	Inhaca Is., Abril Point, flat rocks, sand and coral, 17-19 m, 26°06,3'S-32°58,0'E, 27NOV2011, Expedition INHACA.		
MS3	Inhaca Is., Torres Point, rocks with coral, sponges, oysters, 8-10 m, 26°04,4'S-32°57,2'E, 28/29NOV2011, Expedition INHACA.		
MS4	Inhaca Is., Vermelha Barrier, sand, rocks and coral blocks, 6 m, 26°01,1'S-32°54,1'E, 29NOV2011, Expedition INHACA.		
MS6	Inhaca Is., in front of the Pass, rocks and coral, 17-28 m, 26°04,4'S-33°00,5'E, 30NOV2011, Expedition INHACA.		
MS7	Inhaca Is., Torres Point, rocks, sand and muds, 4-12 m, 26°04,4'S-32°57,1'E, 01.09DEC2011, Expedition INHACA.		
MS10	Inhaca Is., towards China Bank, dand and dead corals, 25°59,4'S-32°54,2'E, 03DEC2011, Expedition INHACA.		
MS11	Inhaca Is., Vermelha Barrier, sand and mud, dead and living coral, 6 m, 26°01,0'S-32°54,1'E, 30DEC2011, Expedition INHACA.		
MS13	Inhaca Is., dos Portugueses Is., reef, 15 m, 25°58,6'S-32°54,1'E, 06DEC2011, Expedition INHACA.		
MS14	Inhaca Is., Baixo Danae, reef with sandy passages, 23-26 m, 25°54,5'S-33°02,8'E, 08.11DEC2011, Expedition INHACA.		
MS16	Inhaca Is., flat rock, 17 m, 10DEC2011, Expedition INHACA.		

Mozambique Channel and Comore Expedition  
BIOMAGLO

CP4798	Glorieuses Is., N/O"Antea", 11°27'S-47°21'E, 23JAN2017.	80-147	m,
DW4789	Geyser Bank, N/O"Antea", 12°22'S-46°25'E, 22JAN2017.	340-342	m,
DW4800	Glorieuses Is., N/O"Antea", 11°27'S-47°19'E, 24JAN2017.	240-255	m,
DW4801	Glorieuses Is., N/O"Antea", 11°27'S-47°19'E, 24JAN2017.	385-410	m,
DW4807	Glorieuses Is., N/O"Antea", 11°30'S-47°28'E, 25JAN2017.	97-124	m,
DW4808	Glorieuses Is., N/O"Antea", 11°30'S-47°28'E, 25JAN2017.	219-224	m,
DW4812	Glorieuses Is., N/O"Antea", 11°29'S-47°29'E, 25JAN2017.	390-417	m,

DW4813	Glorieuses Is., N/O"Antea", 11°29'S-47°29'E, 25JAN2017.	583-614	m,
DW4818	Glorieuses Is., N/O"Antea", 11°37'S-47°20'E, 26JAN2017.	797-816	m,
DW4820	S Mayotte, N/O"Antea", 13°05'S-45°06'E, 27JAN2017.	295-336	m,
DW4826	S Mayotte, N/O"Antea", 13°05'S-45°07'E, 27JAN2017.	489-496	m,
DW4831	SW Mayotte, N/O"Antea", 13°01'S-44°57'E, 03FEB2017.	660-664	m,
DW4835	SE Mohell, N/O"Antea", 12°26'S-43°56'E, 28JAN20117.	763-769	m,
DW4836	SE Mohell, N/O"Antea", 12°25,2'S-43°55,9'E, 28JAN20117.	82-88	m,
DW4839	S Grande Camore, N/O"Antea", 12°07'S-43°32'E, 29JAN2017.	904-1014	m,
DW4842	SW Mohell, N/O"Antea", 12°23'S-43°33'E, 29JAN20117.	388-420	m,
DW4846	W Mayotte, N/O"Antea", 12°41'S-44°58'E, 30JAN2017.	439-502	m,
DW4847	W Mayotte, N/O"Antea", 12°41'S-44°57'E, 30JAN2017.	738-736	m,
DW4848	NW Mayotte, N/O"Antea", 12°35'S-44°55'E, 30JAN2017.	399-402	m,
DW4851	SW Mayotte, N/O"Antea", 13°01'S-44°57'E, 03FEB2017.	860-864	m,
DW4854	W Mayotte, N/O"Antea", 12°56'S-44°58'E, 04FEB2017.	455-465	m,
DW4860	NW Mayotte, N/O"Antea", 12°31'S-44°55'E, 05FEB2017.	486-646	m,
DW4863	NW Mayotte, N/O"Antea", 12°30'S-44°56'E, 06FEB2017.	606-610	m,
DW4864	SE Mayotte, N/O"Antea", 12°56'S-45°15'E, 07FEB2017.	455-487	m,
DW4865	S Mayotte, N/O"Antea", 12°56'S-44°15'E, 07FEB2017.	489-496	m,
DW4866	SE Mayotte, N/O"Antea", 12°58'S-45°15'E, 07FEB2017.	667-712	m,
DW4869	SE Mayotte, N/O"Antea", 12°58'S-45°16'E, 07FEB2017.	917-1070	m,
DW4871	NE Mayotte, N/O"Antea", 12°44'S-45°19'E, 08FEB2017.	462-486	m,

New Caledonia

Stn 1334	Noumea area, between Ilot Maitre and Larégnère, slab background with sargassum, 16 m, 22°20,1'S-166°23,2'E, 18JUN1992.
Stn 1336	Noumea area, near Ile aux Canards, sucker on blocs, sargassum harvest, 18 m, 22°19,0'S-166°26,1'E, 30JUN1992.
Stn 1358	Noumea area, Ste Marie Bay, mud on coarse bottom and dead coral, 14 m, 22°18,6'S-166°28,2'E, 04JUN1993.
Stn 1374	Grotte Merlet, sediment of dead and living shells, 20-35 m, 22°40,2'S-166°37,9'E, 21JAN1993.
Stn 1436	Loyalty Is., Lifou, Santal Bay, Gaatcha Bay, 10-20 m, 20°55,5'S-167°0,2'E, 10NOV2000, Atelier LI-FOU.
CP755	495 m, 22°22'S-166°14'E, 16MAY1993, N/O "Alis" Expedition BATHUS 2.
CP4658	W Ile de Pins, 303-315 m, 22°42'S-167°13,5'E, 10AUG2016, N/O "Alis" Expedition KANOCONO.
DW1233	Cap Woodin, 45-50 m, 22°23,6'S-166°47,7'E, 09MAR1993, N/O"Alis" Expedition LAGON.

## Etymology

*serenamirrii*, after Serena Mirri of Faenza (Ravenna, Italy) wife of the diver Marco Sieni who contributes to our research reporting marine sediments.

## STATIONS

### Austral Islands

DW1877	Mac Donals Bank, 59-150 m, 28°59'S-140°15'W, 04NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1885	Marotiri Is., 700-800 m, 27°52'S-143°33'W, 06NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1886	Marotiri Is., 600-1000 m, 27°51'S-143°32'W, 06NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1888	Marotiri Is., 100-120 m, 27°51'S-143°31'W, 06NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1889	E Rapa, 600-620 m, 27°37'S-144°16'W, 07NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1901	Bank NE Rapa, 115-120 m, 27°25'S - 144°02'W, 09NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1915	Neilson Reef, 120-200 m, 27°03'S-146°04'W, 11NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1925	Neilson Reef, 560-790m, 27°00'S - 146°05'W, 12NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1926	President Thiers Bank, 50-90 m, 24°38,16'S-146°00,82'W, 13NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1927	President Thiers Bank, 105-95 m, 24°39'S-146°01,6'W, 13NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1932	President Thiers Bank, 500-800 m, 24°41'S-146°02'W, 14NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1933	President Thiers Bank, 500-850 m, 24°41'S-146°01'W, 14NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1937	President Thiers Bank, 469-500 m, 24°40'S-146°56'W, 14NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1943	N Raivavae, 950 m, 24°49'S-147°39'W, 15NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1993	Rurutu, Mont du Lotus, 511-767 m, 22°33'S-151°00'W, 22NOV2002, N/O "Alis" Expedition BENTHAUS.
DW1998	North coast of Rurutu, 250-302 m, 22°25'S-151°22'W, 23NOV2002, N/O "Alis" Expedition BENTHAUS.
DW2003	Rurutu, estern coast, 250-330 m, 22°28'S-151°19'W, 24NOV2002, N/O "Alis" Expedition BENTHAUS.
DW2010	Rurutu, southern coast, 520-950 m, 22°32'S-151°21'W, 24NOV2002, N/O "Alis" Expedition BENTHAUS.
DW2013	Rimatara, 80-93 m, 22°38,57'S-152°49,73'W, 25NOV2002, N/O "Alis" Expedition BENTHAUS.
DW2020	Rimatara, 920-930 m, 22°37'S-152°49'W, 25NOV2002, N/O "Alis" Expedition BENTHAUS.

### Fiji Islands

BS10	Viti Levu, S Lagoon, 123 m, 18°11,8'S-178°30,4'E, 14OCT1998, N/O "Alis", Expedition SUVA 2.
BS43	Viti Levu, W Lagoon, 26 m, 17°51,6'S-177°13,4'E, 19OCT1998, N/O "Alis", Expedition SUVA 2.
DW62	Viti Levu, W Lagoon, 32 m, 17°47,9'S-177°12,9'E, 20OCT1998, N/O "Alis", Expedition SUVA 2.
DW1345	Bligh Water, N/O "Alis", 660-663 m,

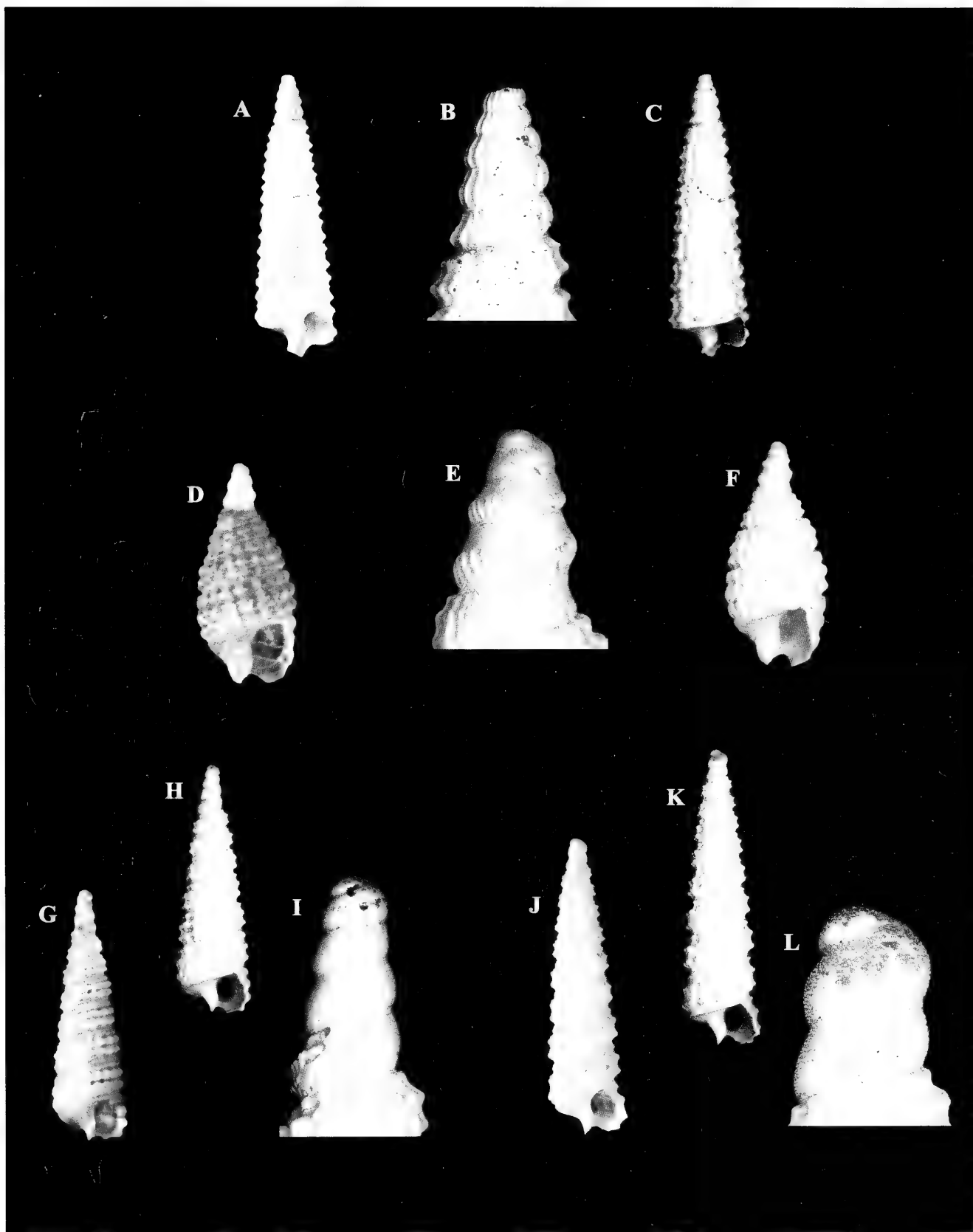
17°14,9'S-178°29,5'E, 11AUG1988, Expedition MUSORSTOM 10.

### Marquesas Islands

DW1154	Eiao Is., 102 m, 7°58,5'S-140°43,7'W, 23AUG1997, N/O "Alis" Expedition MUSORSTOM 9.
DW1218	Hiva Oa Is., 125-135 m, 9°44,5'S-138°50,9'W, 30AUG1997, N/O "Alis" Expedition MUSORSTOM 9.
DW1222	Hiva Oa Is., 340-352 m, 9°44'S-138°51'W, 30AUG1997, N/O "Alis" Expedition MUSORSTOM 9.
DW1242	Fatu Hiva Is., 119-122 m, 10°28,1'S-138°41,1'W, 01SEP1997, N/O "Alis" Expedition MUSORSTOM 9.
DR1200	Hiva Oa Is., 96-100 m, 9°49,9'S-139°08,9'W, 28AUG1997, N/O "Alis" Expedition MUSORSTOM 9.
DR1247	Fatu Hiva Is., 1150-1250 m, 10°34'S-138°42'W, 01SEP1997, N/O "Alis" Expedition MUSORSTOM 9.
DW1206	Hiva Oa Is., 352-358 m, 9°51'S-139°09'W, 28AUG1997, N/O "Alis" Expedition MUSORSTOM 9.
Stn 02	Nuku Hiva, Taiohae Bay, W Matauapuna, 10-20 m, 8°56,22'S-140°05,68'W, 18OCT1999.
Stn 03	Nuku hiva, Taiohae Bay, W Motu Nui, 10-20 m, 8°56,17'S-140°06,66'W, 18OCT1999.
Stn 12	Ua Huka, Hiniaehi-B-Hinitaiava, sidewalk with sand bowls, 8°56,00'S-139°32,80'W, SEP1997.
Stn 20	Ua Pou, Motu Mokohe, 10-15 m, 9°20,81'S-140°05,81'W, 26OCT1999.
Stn 22	Ua Huka, Vaipae Bay, sand on gray mud, 6-10 m, SEP1997.
Stn 23	Ua Huka, Haamamao Bay, sidewalk, sand bowls, pebbles, 8°55,90'S-139°31,45'W, SEP1997.
Stn 35	Ua Huka, S Haamamao Bay coast, limestone sans + shell debris, 25 m, 8°55,90'S-139°31,20'W, OCT1997.
Stn D86	Fatu Hiva Is., 49 m, 10°29'S-138°40'W, 29JAN1991.

### Mozambique

MB1	Inhaca Is., Torres Point, rocks with coral, sponges, oysters, 5-8 m, 26°04,4'S-32°57,2'E, 09DEC2011, Expedition INHACA.
MB5	Inhaca Is., Vermelha Barrier, sand, bowl, dead and living coral, 6 m, 26°01,0'S-32°54,1'E, 03DEC2011, Expedition INHACA.
MB6	Inhaca Is., SW dos Portugueses Is., sand and dead corals, 2-10 m, 25°59,5'S-32°54,3'E, 05DEC2011, Expedition INHACA.
MB7	Inhaca Is., in front to village, sand, rocks, 2-10 m, 25°59,7'S-32°54,2'E, 05DEC2011, Expedition INHACA.
MD7	Inhaca Is., Abril Point, biodetritic sand, 26-37 m, 26°06,3'S-32°58,0'E, 27NOV2011, Expedition INHACA.
MD13	Inhaca Is., North of the passage, sand, 50-53 m, 26°03,1'S-33°01,0'E, 30NOV2011, Expedition INHACA.
MD16	Inhaca Is., south of the Pass, gravels, 56-57 m, 26°07,6'S-33°00,7'E, 01DEC2011, Expedition INHACA.



**Fig. 26. [Salomon; Tuamotu; Vanuatu]. A-C.** *Retilaskeya philippinensis* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25543), 3,85 x 1,12 mm, Solomon, Choiseul, stn CP2228; **D-F.** *Marshallopsis utriculus* Cecalupo & Perugia, 2017 (MNHN-IM-2012-25544), 1,76 x 0,83 mm, Tuamotu, Hereheretue Atoll, stn TH02; **G-I.** *Clathropsis luteocincta* Cecalupo & Perugia, 2013 (MNHN-IM-2012-25545), 2,95 x 0,85 mm, protoconch 0,55 x 0,25 mm, Vanuatu, Bruat Channel, N coast of Malo Is., stn DB25; **J-L.** *Clathropsis serenamirrii* n. sp., holotype (MNHN-IM-2000-36060), 3,96 x 0,83 mm, protoconch 0,52 x 0,29 mm, Vanuatu, Bruat Channel, N coast of Malo Is., stn DB25.

**Fig. 26. [Salomon; Tuamotu; Vanuatu]. A-C.** *Retilaskeya philippinensis* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25543), 3,85 x 1,12 mm, Solomon, Choiseul, stn CP2228; **D-F.** *Marshallopsis utriculus* Cecalupo & Perugia, 2017 (MNHN-IM-2012-25544), 1,76 x 0,83 mm, Tuamotu, Hereheretue Atoll, stn TH02; **G-I.** *Clathropsis luteocincta* Cecalupo & Perugia, 2013 (MNHN-IM-2012-25545), 2,95 x 0,85 mm, protoconcha 0,55 x 0,25 mm, Vanuatu, Bruat Channel, costa nord dell'isola di Malo, stn DB25; **J-L.** *Clathropsis serenamirrii* n. sp., oiotipo (MNHN-IM-2000-36060), 3,96 x 0,83 mm, protoconcha 0,52 x 0,29 mm, Vanuatu, Bruat Channel, costa nord dell'isola di Malo, stn DB25

## PACIFIC OCEAN MATERIAL: TUAMOTU

### *Marshallopsis melanesiana*

Cecalupo & Perugia, 2013  
not figured

#### Type locality

Philippines, Panglao Is, near Napaling, up to 30 m.

#### Distribution

Vanuatu, Tuamotu, Hereheretue Atoll, 60 m.

#### Material examined

stn DW4300, Siga Is., spm 1, 470-526 m, Expedition Madeep.

#### Remarks

First report from Tuamotu.

### *Marshallopsis utriculus*

Cecalupo & Perugia, 2017  
(Fig. 26. D-F)

#### Figured specimen

D-F - (MNHN-IM-2012-25544) 1.76 x 0.83 mm, stn TH02.

#### Type locality

New Caledonia, Touho, Haut-Fond de Tié, 5-25 m.

#### Distribution

New Caledonia, Tuamotu.

#### Material examined

stn TH02, Hereheretue Atoll, spm 1, 60 m, Expédition TUAM' 2011.

#### Remarks

First report from Tuamotu.

## PACIFIC OCEAN MATERIAL: VANUATU

### *Clathropsis luteocincta*

Cecalupo & Perugia, 2013  
(Fig. 26. G-I)

#### Figured specimen

G-I - (MNHN-IM-2012-25545) 2.95 x 0.85 mm, protoconch 0.55 x 0.25 mm, stn DB25.

#### Type locality

Vanuatu, Espiritu Santo is., S Tutuba Is., 32-40 m.

#### Distribution

New Caledonia, South Madagascar, Vanuatu.

#### Material examined

stn DB25, Bruat Channel, North coast of Malo Is., spm 1, 10 m, Expédition SANTO 2006.

### *Clathropsis serenamirrii* n. sp. (Fig. 26. J-L)

#### Type material

holotype - (MNHN-IM-2000-36060) 3.96 x 0.83 mm, protoconch 0.52 x 0.29 mm, stn DB25.

#### Type locality

Vanuatu, Santo Is., Bruat Channel, N coast of Malo Is., 10 m.

#### Distribution

Known only from Vanuatu.

#### Material examined

stn DB25, Bruat Channel, North coast of Malo Is., spm 1, 10 m, Expédition SANTO 2006.

#### Description of holotype

Shell small, conical, regularly increasing, wide sutures, colour opaque white. Protoconch cylindrical of 3.5 convex whorls; see under SEM whorls wholly granulous. Teleoconch of about 8 convex whorls with reticulate sculpture of 3 narrow spiral cords (1<sup>st</sup> cord much less prominent on the edge of the suture), crossed by axial ribs, 16 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by an angle. Columella acuminate, smooth; outer lip thin, bordered by sculpture of the teleoconch.

#### Comparison

*Clathropsis serenamirrii* n. sp. has a protoconch very similar to *Tuberclipsis cataldinii* Cecalupo & Perugia, 2013 from Vanuatu and *Tuberclipsis miranda* Cecalupo & Perugia, 2012 from Philippines, both differ for the sculpture of the teleoconch and the weakly impressed sutures. It is also compared with *Cerithiella kaitotsuzukii* Cecalupo & Perugia, 2019 from Okinawa which differs having a ratio W/L of 0.31 vs 0.20, sutures less wide and orange colour.

## Type locality

Salomon Is., Vella Gulf, 229-236 m.

## Distribution

Known only from type locality.

## Material examined

stn DW2257, Vella Gulf, spms 2, 229-236 m, Expedition SALOMON 2.

## Description of holotype

Shell medium in size, narrowly conical regularly increasing with flat sides, moderately distinct sutures, base excavate: colour white, opaque. Protoconch conical of 2.5-3 convex whorls sculptured by 14 prominent axial riblets extending from suture to suture, smooth interspaces; transition to teleoconch indefinible. Teleoconch of 11.5 whorls with reticulate sculpture of 3 spiral cords (1<sup>st</sup> cord little prominent closely adjacent to 2<sup>nd</sup>). Spirals crossed by axial ribs, about 16 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip following by a thinner other. Columella short, aperture sub-quadrate, outer lip slightly damaged.

## Comparison

*Mendax samadiae* n. sp. is compared with *Mendax metivieri* Jay & Drivas, 2002 from La Reunion and *M. spiritussanctis* Cecalupo & Perugia, 2013 from Vanuatu, which differ having a protoconch similar in shape and sculpture but with thin spiral threads on their interspaces and a teleoconch with ratio W/H 0.30 vs 0.23 of *M. samadiae* n. sp.

## Etymology

*samadiae*, after Sarah Samadi, MNHN Professor and the initiator of many deep-sea expeditions in the SW Pacific in New Caledonia, Papua New Guinea and the Salomon Is.

*Mendax* sp.  
(Fig. 25. J-K)

## Figured specimen

J-K - (MNHN-IM-2012-25542) 4.93 × 1.43 mm, protoconch missing, stn DW1745.

## Distribution

Known only from Salomon.

## Material examined

stn DW1745, Salomon Is., spm 1, 253-356 m, Expedition SALOMON 1.

## Description

Shell medium in size, narrowly conical regularly increasing with flat sides, impressed sutures, base excavate: colour white, opaque. Protoconch missing. Teleoconch of 11.5 whorls with reticulate sculpture of 2 prominent spiral cords crossed by axial ribs, about 18 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip following by a thinner other. Limit between columella and last whorl highlighted by an angle. Columella short, aperture sub-quadrate, outer lip slightly damaged.

## *Retilaskeya philippinensis*

Cecalupo & Perugia, 2012  
(Fig. 26. A-C)

## Figured specimen

A-C - (MNHN-IM-2012-25543) 3.85 × 1.12 mm, protoconch damaged, stn CP2228.

## Type locality

Philippines, W Pamilacan Is., Cervera, 80-120 m.

## Distribution

Papua New Guinea, Philippines, Salomon.

## Material examined

stn CP2228, Choiseul, spm 1, 609-625 m, Expedition SALOMON 2.

## Remarks

First report from Salomon.

*Synthopsis noninii*  
(Cecalupo & Perugia, 2012)  
not figured

## Type locality

Philippines, Pangao Is., near Napaling, up to 30 m.

## Distribution

Indo-Pacific range.

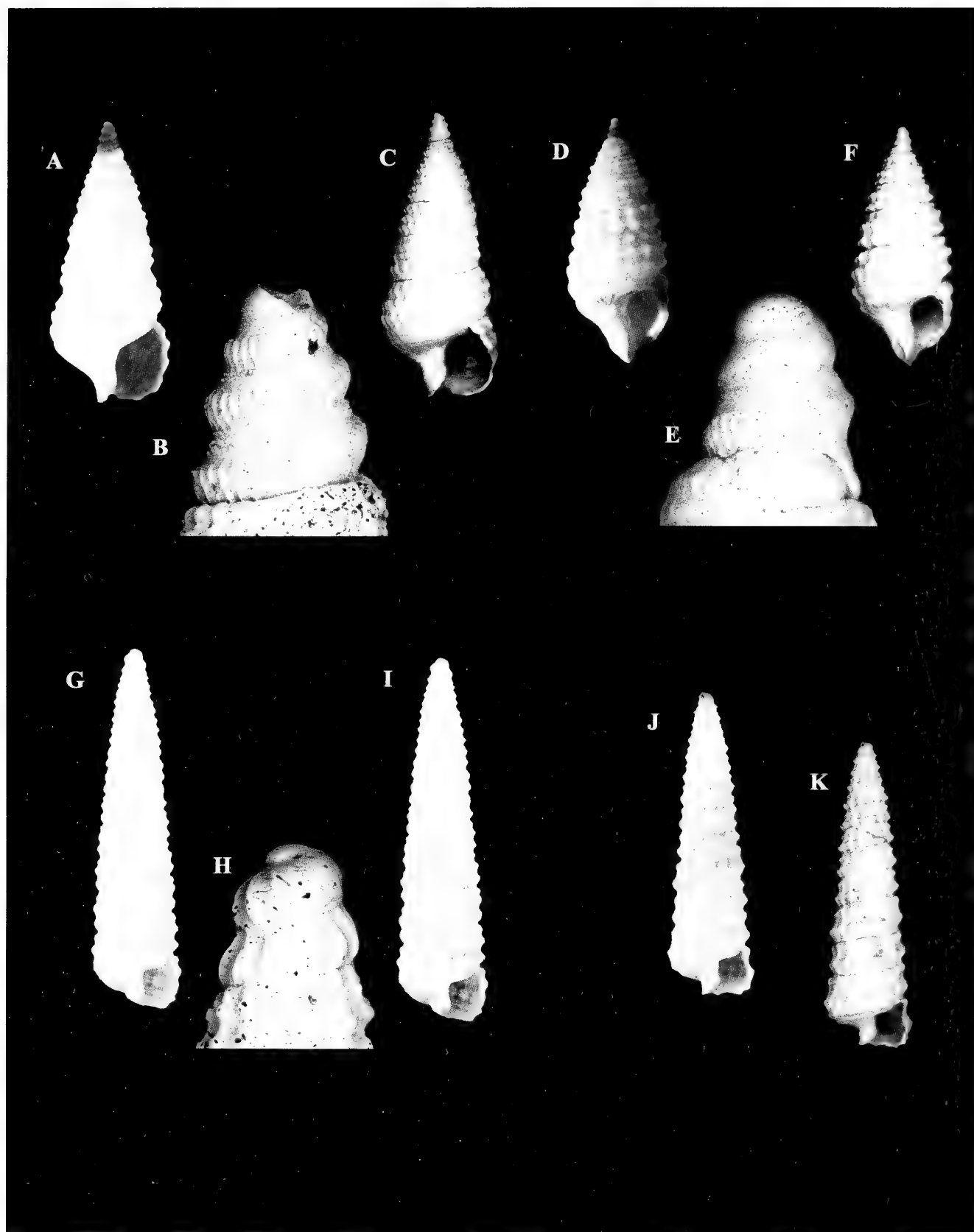
## Material examined

stn DW4300, Siga Is., spm 1, 470-526 m, Expedition Madeep.

## Remarks

First report from Salomon.





**Fig. 25. [Salomon; Papua New Guinea]. A-C.** *Marshallopsis sossai* n. sp., holotype (MNHN-IM-2000-36056), 4,55 x 1,85 mm, Salomon Sea, Budibudi Is., North Archipelago Laughlan, stn DW4285; **D-F.** *Marshallopsis sossai* n. sp., paratype 1 ((MNHN-IM-2000-36057), 4,25 x 1,80 mm, protoconch 0,49 x 0,33 mm, Papua New Guinea, Vitiaz Strait, stn DW3719; **G-I.** *Mendax samadiae* n. sp., holotype (MNHN-IM-2000-36059), 5,79 x 1,36 mm, protoconch 0,45 x 0,33 mm, Salomon Is., Vella Gulf, stn DW2257; **J-K.** *Mendax* sp. (MNHN-IM-2012-25542), 4,93 x 1,43 mm, Salomon Is., stn DW1745

**Fig. 25. [Salomon; Papua New Guinea]. A-C.** *Marshallopsis sossai* n. sp., olotipo (MNHN-IM-2000-36056), 4,55 x 1,85 mm, Salomon Sea, Budibudi Is., a nord dell'Arcipelago Laughlan, stn DW4285; **D-F.** *Marshallopsis sossai* n. sp., paratipo 1 ((MNHN-IM-2000-36057), 4,25 x 1,80 mm, protoconca 0,49 x 0,33 mm, Papua New Guinea, Vitiaz Strait, stn DW3719; **G-I.** *Mendax samadiae* n. sp., olotipo (MNHN-IM-2000-36059), 5,79 x 1,36 mm, protoconca 0,45 x 0,33 mm, Salomon Is., Vella Gulf, stn DW2257; **J-K.** *Mendax* sp. (MNHN-IM-2012-25542), 4,93 x 1,43 mm, Salomon Is., stn DW1745

**PACIFIC OCEAN MATERIAL: PHILIPPINES**

*Joculator* cfr. *dupouxae*  
Cecalupo & Perugia, 2018  
(Fig. 24. L-N)

**Figured specimen**

L-N - (MNHN-IM-2012-25541) 2.08 x 0.90 mm, protoconch 0.45 x 0.27 mm, stn L46.

**Type locality**

Papua New Guinea, Kavieng Lagoon, betw. Limonak Is. and Limelon Is., 15-20 m.

**Distribution**

Papua New Guinea, Philippines.

**Material examined**

Philippines, stn L46, Balicasag Is., spm 1, 90-110 m.

**Remarks**

Having only one specimen, its specific classification becomes difficult; *Joculator dupouxae* is very similar, it differs only having a darker colour. First report from the Philippines.

**PACIFIC OCEAN MATERIAL: SALOMON Is.**

*Horologica gregaria*  
Cecalupo & Perugia, 2012  
not figured

**Type locality**

Philippines. Mactan Is, Olango Channel, 60-80 m.

**Distribution**

Indo-Pacific range.

**Material examined**

stn CP2228, Choiseul, spm 1, 609-625 m, Expedition SALOMON 2.

**Remarks**

First report from Salomon.

*Marshallopsis sossoi* n. sp.  
(Fig. 25. A-C, D-F)

**Type material**

holotype - (MNHN-IM-2000-36056) 4.55 x 1.85 mm, protoconch embryonic whorl broken, stn DW4285

paratype 1 - (MNHN-IM-2000-36057) 4.25 x 1.80 mm, protoconch 0.49 x 0.33 mm, stn DW3719.  
paratype 2 - (MNHN-IM-2000-36058) 4.95 x 2.05 mm, protoconch 0.55 x 0.36 mm, stn DW4285.

**Type locality**

Salomon Sea, Budibudi Is., N Archipelago Laughlan, 380-411 m.

**Distribution**

Papua New Guinea, Salomon.

**Material examined**

stn DW4285, Salomon Sea, Budibudi Is., N Archipelago Laughlan, spms 3, 380-411 m, Expedition MADEEP; stn DW3719, Papua New Guinea, Vitiaz Strait, spm 1, 410 m, Expedition BIOPAPUA.

**Description of holotype**

Shell medium size, conical with impressed sutures, in bad condition with aperture damaged. Protoconch conical of 3.5 convex whorls; seen under SEM first 1.5 embryonic whorls smooth except for the beginning of a granularity above and below the suture, next whorls are smooth on the upper half, except for the more evident grains below the suture, and sculptured on the lower half with thin axial prosocline riblets (about 30) regularly spaced; colour brown. Teleoconch of 5 whorls with reticulate sculpture of 3 spiral cords (1<sup>st</sup> cord smaller), crossed by weaker axial ribs about 16 on last whorl; evident beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a weaker angle. Aperture damaged: columella with columellar callus. Colour whitish.

**Comparison**

The only possible comparison is with the rather similar *Prolixodens alba* Cecalupo & Perugia, 2017 from New Caledonia; *Marshallopsis sossoi* n. sp. it reaches larger dimensions and, under SEM, the difference in the sculpture of the protoconch is noted, prosocline riblets from suture to suture in *P. alba* while in *M. sossoi* they are only the lower half.

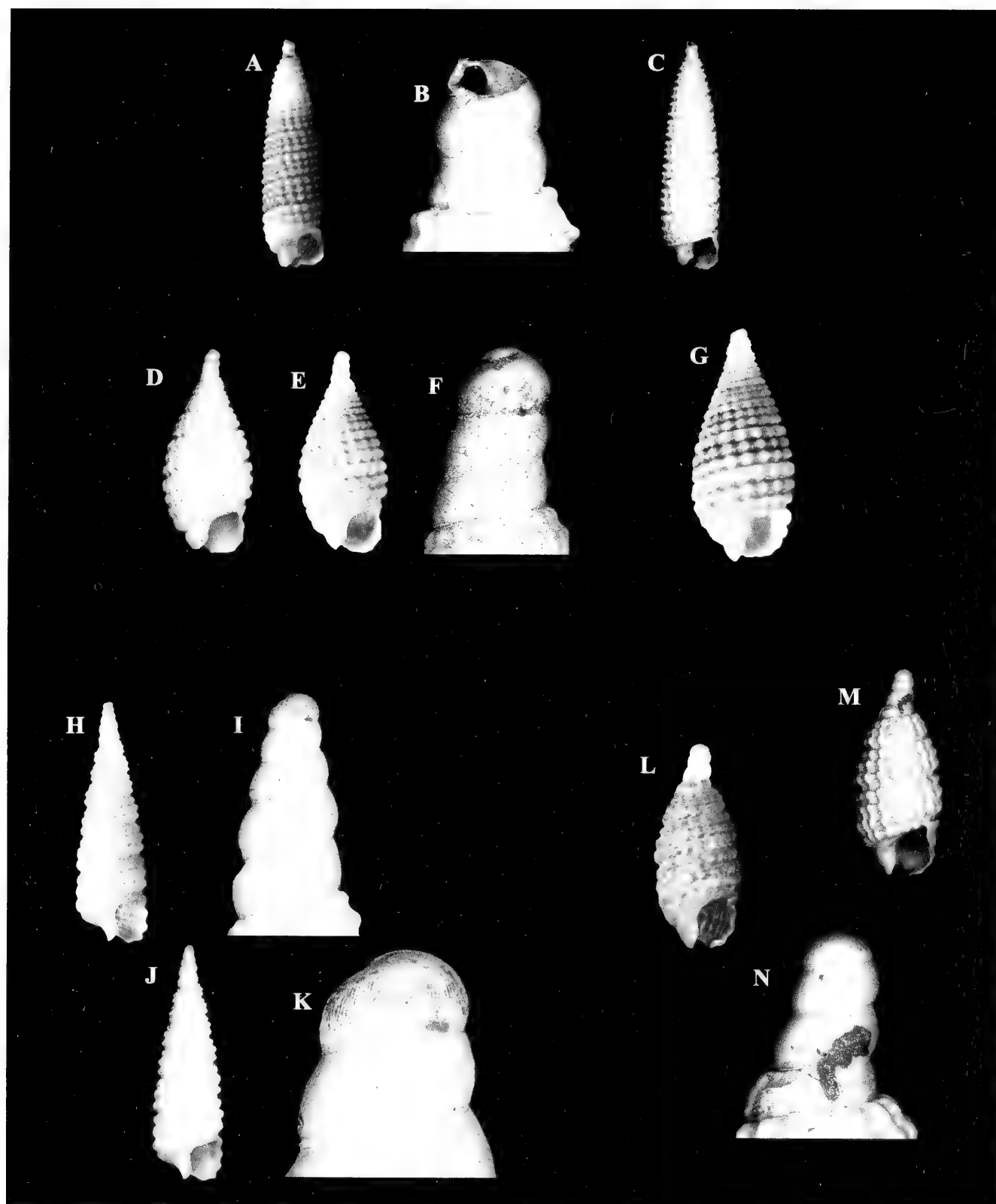
**Etymology**

*sossoi*, after Maurizio Sosso of Genova member of the Società Italiana di Malacologia (SIM).

*Mendax samadiae* n. sp.  
(Fig. 25. G-I)

**Type material**

holotype - (MNHN-IM-2000-36059) 5.79 x 1.36 mm, protoconch 0.45 x 0.33 mm, stn DW2257.



**Fig. 24. [Fiji; Marquesas; Papua New Guinea; Philippines]. A-C.** *Synthopsis maioi* n. sp., holotype (MNHN-IM-2000-36045), 4,20 x 1,10 mm, Fiji Islands, Bligh Water, stn DW1345; **D-F.** *Synthopsis uahucaensis* n. sp., holotype (MNHN-IM-2000-36046), 2,71 x 1,25 mm, protoconch 0,47 x 0,27 mm, Marquesas Archipelago, Ua Huca Is., coast South Haamamao Bay, stn 35. **G.** *Synthopsis uahucaensis* n. sp., paratype 1 (MNHN-IM-2000-36047), 3,45 x 1,60 mm, Marquesas Archipelago, Ua Huca Is., coast South Haamamao Bay, stn 35; **H-J, K.** *Clathropsis annelaurae* Cecalupo & Perugia, 2018 (MNHN-IM-2012-25537), 3,62 x 1,14 mm, protoconch 0,62 x 0,28 mm, Papua New Guinea, Bismarck Archipelago, Lemus Is., **K.** *C. annelaurae* detail of the protoconch; **L-N.** *Joculator* cf. *dupouxae* Cecalupo & Perugia, 2018 (MNHN-IM-2012-25541), 2,08 x 0,90 mm, protoconch 0,45 x 0,27 mm, Philippines, Balicasag Is., stn L46

**Fig. 24. [Fiji; Marquesas; Papua New Guinea; Philippines]. A-C.** *Synthopsis maioi* n. sp., olotipo (MNHN-IM-2000-36045), 4,20 x 1,10 mm, Fiji Islands, Bligh Water, stn DW1345; **D-F.** *Synthopsis uahucaensis* n. sp., olotipo (MNHN-IM-2000-36046), 2,71 x 1,25 mm, protoconca 0,47 x 0,27 mm, Marquesas Archipelago, Ua Huca Is., costa sud di Haamamao Bay, stn 35. **G.** *Synthopsis uahucaensis* n. sp., paratipo 1 (MNHN-IM-2000-36047), 3,45 x 1,60 mm, Marquesas Archipelago, Ua Huca Is., costa sud di Haamamao Bay, stn 35; **H-J, K.** *Clathropsis annelaurae* Cecalupo & Perugia, 2018 (MNHN-IM-2012-25537), 3,62 x 1,14 mm, protoconca 0,62 x 0,28 mm, Papua New Guinea, Bismarck Archipelago, Lemus Is., **K.** *C. annelaurae* detail of the protoconca; **L-N.** *Joculator* cf. *dupouxae* Cecalupo & Perugia, 2018 (MNHN-IM-2012-25541), 2,08 x 0,90 mm, protoconca 0,45 x 0,27 mm, Philippines, Balicasag Is., stn L46

*Synthopsis noninii*  
Cecalupo & Perugia, 2012  
(not figured)

Type locality

Panglao Is., Philippines.

Distribution

Indo-Pacific range.

Material examined

stn DW1345, Bligh Water, 660-663 m, spm 1, Expedition MUSORSTOM 10.

Remarks

First report from Fiji.

PACIFIC OCEAN MATERIAL: MARQUESAS

*Synthopsis uahucaensis* n. sp.  
(Fig. 24. D-G)

Type material

holotype - (MNHN-IM-2000-36046) 2.71 x 1.25 mm, protoconch 0.47 x 0.27 mm, stn 35.  
paratype 1 - (MNHN-IM-2000-36047) 3.45 x 1.60 mm, protoconch broken, stn 35.

Type locality

Marquesas Archipelago, Ua Huca Is., 25 m.

Distribution

Known only for Marquesas Archipelago, Ua Huca Is.

Material examined

stn 35, Ua Huca Is. coast South Haamamao Bay, spms 2, 25 m, Atelier MARQUISES 1997.

Description of holotype

Shell small, oval with constricted base, impressed sutures. Protoconch conical of 3.5 convex whorls; seen under SEM first 1.5 embryonic whorls smooth on the upper half and granulous in the lower half, next whorls smooth with sutures marked by minute grains; colour white, opaque. Teleoconch of 5.5 whorls with reticulate

sculpture of 3 equal spiral cords crossed by weaker axial ribs, about 20 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a furrow. Columella short and broad, obliquely truncated, with surface crossed by thin threads, columellar callus bordering a sub-circular aperture; edge of outer lip slightly damaged, siphonal canal well defined. Colour pinkish, whitish beads, white the first spiral cord on last whorl.

Comparison

*Synthopsis uahucaensis* n. sp. is compared with *Joculator arduinii* and *Joculator quaggiottoi* both Cecalupo & Perugia, 2012 from Philippines reported also from Okinawa (Cecalupo & Perugia, 2019); both have a very similar but darker colour (from dark brown to red brown), the first has a similar protoconch, the second slender, both protoconch with smooth whorls and without minute grains on the sutures.

Etymology

*uahucaensis*, from type locality.

PACIFIC OCEAN MATERIAL:  
PAPUA NEW GUINEA

*Clathropsis annelaurae*  
Cecalupo & Perugia, 2018  
(Fig. 24. H-J, K)

Figured specimen

H-K - (MNHN-IM-2012-25537) 3.62 x 1.14 mm, protoconch 0.62 x 0.28 mm, Lemus Is., stn KM24.

Type locality

Papua New Guinea, Niugini, W Yabob Is.

Distribution

Known only from Papua New Guinea.

Material examined

stn KM24, Papua New Guinea, New Ireland, Lemus Is., spm 1, Expedition KAVIENG 2014.

Remarks

Second report from Papua New Guinea. The sculpture of the embryonic whorl leaves no doubt about the specific classification; this specimen has a white semitransparent background colour with 1<sup>st</sup> spiral cord yellowish while the holotype has pale violet colour.

conical of 4.5 convex whorls; seen under SEM first 1.5 embryonic whorls completely granulous, next whorls show a sculpture of thin axial prosocline riblets (about 30 per whorl) suture to suture, regularly spaced and 2-3 lines of minute subsutural grains. Teleoconch of 9 whorls with reticulate sculpture of spiral cords: on first 3 whorls 1<sup>st</sup> and 2<sup>nd</sup> cords are fused together, on subsequent begin to divide and they are 3 on last whorl. Spiral cords crossed by weaker axial ribs, about 21 on last whorl; beads at each intersection. A fourth beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a groove. Columella short and broad, obliquely truncated, with surface crossed by thin threads, columellar callus bordering a sub-quadrate aperture; anal sulcus and siphonal canal well defined.

### Comparison

*Prolixodens giampii* n. sp. is rather similar to *P. infracolour* (Laseron, 1951) from Australia, here reported, which differs being larger with more acuminate shape, *Prolixodens giampii* n. sp. is more inflated, and having a sculpture of the teleoconch of 3 spiral cords while *Prolixodens giampii* has 1<sup>st</sup> and 2<sup>nd</sup> cords fused.

### Etymology

*giampii*, after Giampaolo Lomurno of Matera (Italy), grandson of Ivan Perugia for his interest in Malacology.

### *Synthopsis vavaiensis*

Cecalupo & Perugia, 2014

(Fig. 23. H-J)

### Material figured

H-J - (MNHN-IM-2012-25532) 3.78 x 1.19 mm, protoconch 0.57 x 0.27 mm, stn DW1901.

### Type locality

Austral Is. (French Polynesia), Rapa Is., Vava.

### Distribution

Known only from Austral Is. (French Polynesia).

### Material examined

stn DW1901, Bank NE Rapa, 115-120 m, spm 1; stn DW1925, Neilson Reef, 560-790 m, spms 3. Expedition BENTHAUS 2002.

## PACIFIC OCEAN MATERIAL: FIJI

### *Marshallopsis boucheti*

Cecalupo & Perugia, 2012

(not figured)

### Type locality

Philippines, Panglao Is., Bingag/Tabalon, up to 80 m.

### Distribution

Indo-Pacific range.

### Material examined

stn DW02, Rewa roads, 23-27 m, spm 1. Expedition SU-VA 4

### Remarks

First report from Fiji.

### *Synthopsis maioi* n. sp.

(Fig. 24. A-C)

### Type material

holotype - (MNHN-IM-2000-36045) 4.20 x 1.10 mm, protoconch broken, stn DW1345.

### Distribution

Fiji Islands.

### Material examined

stn DW1345, Fiji, Bligh Water, 660-663 m, spm 1, Expedition MUSORSTOM 10.

### Description

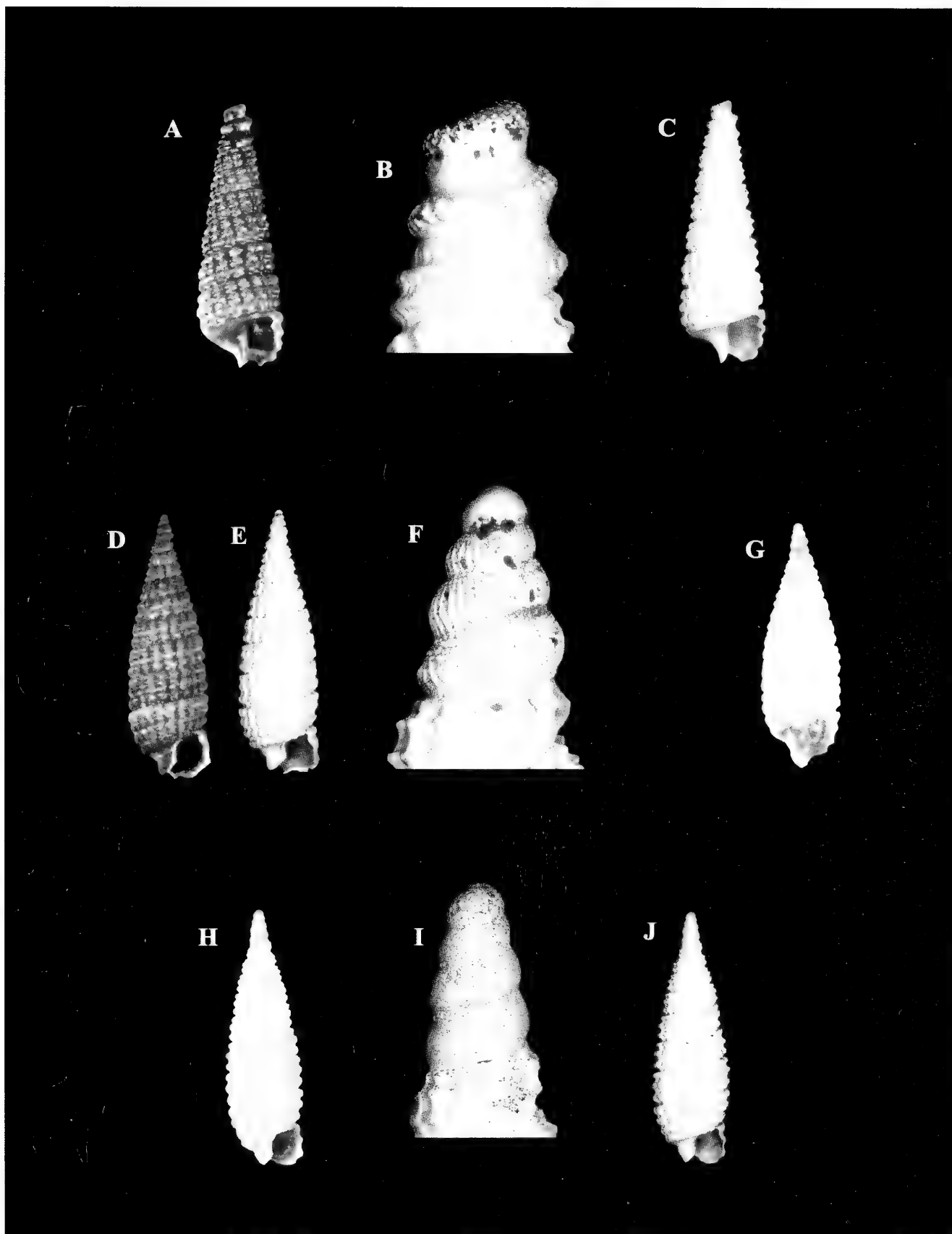
Shell medium in size, near sub-cylindrical, regularly increasing, flat sides, impressed sutures. Protoconch first 1.5-2 whorls missing, cylindrical of 3.5-4.5 convex smooth whorls; colour yellowish, semitransparent. Teleoconch of about 8.5 flat whorls with reticulate sculpture of 3 equal spiral cords crossed by axial ribs, 16 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by an angle. Columella short crossed by growth lines; siphonal canal and anal sulcus well defined, circular aperture. Colour first 4 whorls pale yellowish, following orange.

### Comparison

*Synthopsis maioi* n. sp. is compared with *Sinthopsis rapaensis* Cecalupo & Perugia, 2014 from Austral Is. a and *S. spectabilis* Cecalupo & Perugia, 2012 from Philippines only for its shape but both have a different colour, the first is bicolor and the second uniformly dark orange.

### Etymology

*maioi*, after Nicola Maio of the Università degli Studi di



**Fig. 23. [Austral Is.]. A-C.** *Opariopsis floresi* (Cecalupo & Perugia, 2014) (MNHN-IM-2012-25531), 3,33 x 1,13 mm, protoconch 0,47 x 0,37 mm, Rapa Is., stn ARAP04; **D-F.** *Prolixodens giampii* n. sp., holotype (MNHN-IM-2000-36042), 4,22 x 1,44 mm, protoconch 0,55 x 0,29 mm, Bank NE Rapa, stn DW1901; **G.** *Prolixodens giampii* n. sp., paratype 2 (MNHN-IM-2000-36044), 3,62 x 1,15 mm, protoconch 0,52 x 0,28 mm, Rurutu, south coast, stn DW2010; **H-J.** *Synthopsis vavaiensis* Cecalupo & Perugia, 2014 (MNHN-IM-2012-25532), 3,78 x 1,19 mm, protoconch 0,57 x 0,27 mm, Bank NE Rapa, stn DW1901.

**Fig. 23. [Austral Is.]. A-C.** *Opariopsis floresi* (Cecalupo & Perugia, 2014) (MNHN-IM-2012-25531), 3,33 x 1,13 mm, protoconca 0,47 x 0,37 mm, Rapa Is., stn ARAP04; **D-F.** *Prolixodens giampii* n. sp., olotipo (MNHN-IM-2000-36042), 4,22 x 1,44 mm, protoconca 0,55 x 0,29 mm, Bank a nord est di Rapa, stn DW1901; **G.** *Prolixodens giampii* n. sp., paratipo 2 (MNHN-IM-2000-36044), 3,62 x 1,15 mm, protoconca 0,52 x 0,28 mm, Rurutu, costa a sud, stn DW2010; **H-J.** *Synthopsis vavaiensis* Cecalupo & Perugia, 2014 (MNHN-IM-2012-25532), 3,78 x 1,19 mm, protoconca 0,57 x 0,27 mm, Bank a nord est di Rapa, stn DW1901

### Type locality

Austral Is. (French Polynesia), Rimatara, 920-930 m spm. 1.

### Distribution

Known only from Austral Is. (French Polynesia).

### Material examined

stn DW2020, Rimatara, 920-930 m, spm 1, Expedition BENTHAUS 2002.

### Description of holotype

Shell small, oval with impressed sutures. Protoconch subcylindrical of 3 convex whorls; seen under SEM first 2 whorls smooth, the last smooth on the half upper part, on the lower half, partially immersed in first whorl of teleoconch, show an obsolete sculpture of thin prosocline axial riblets typical of the genus *Marshallopsis*. Colour white, opaque. Teleoconch of 6 whorls with reticulate sculpture of 3 spiral cords (1<sup>st</sup> very bigger), crossed by weaker axial ribs, about 12 on last whorl; at each intersection beads, bigger and rectangular on the 1<sup>st</sup> cord. A fourth beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a cord. Columella short and broad, obliquely truncated, with surface crossed by thin crisp threads, columellar callus bordering an oval aperture; anal sulcus and siphonal canal well defined. Colour white opaque with an orange band on 2<sup>nd</sup> whorl and on the lower part of the last.

### Comparison

Species clearly characterized by the sculpture of the teleoconch and the colour. The sculpture is similar to the specimens of *Marshallopsis* cf. *perinii* reported from Papua New Guinea in Cecalupo & Perugia, 2018: pl. 49, figs 2 a-c.

### Etymology

*giotagliaferroi*, after Giovanni son of Massimo Tagliaferro our collaborator in the execution of SEM photos.

### *Marshallopsis melanesiana*

Cecalupo & Perugia, 2013

not figured

### Type locality

Vanuatu, Espiritu Santo Is., Tutuba Is.

### Distribution

Austral Is, Vanuatu.

### Material examined

stn DW1932, President Thiers Bank, 500-800 m, Expedition BENTHAUS 2002.

### Remarks

First report from Austral Is.

*Oparopsis floresi* (Cecalupo & Perugia, 2014)  
(Fig. 23. A-C)

### Figured specimen

A-C - (MNHN-IM-2012-25531) 3.33 x 1.13 mm, protoconch 0.47 x 0.37 mm, stn ARAP04.

### Type locality

Austral Is. (French Polynesia), Rapa Is., SE Pointe Tematapu.

### Distribution

Known only from Austral Is. (French Polynesia).

### Material examined

stn ARAP04, Rapa, island point, 10 m, spm 1, Expedition TUHAA PAE 2013.

*Prolixodens giampii* n. sp.  
(Fig. 23. D-G)

### Type material

holotype - (MNHN-IM-2000-36042) 4.22 x 1.44 mm, protoconch 0.55 x 0.29 mm, stn DW1901.

paratype 1 - (MNHN-IM-2000-36043) 3.35 x 1.13 mm, protoconch 0.53 x 0.30 mm, stn DW2010.

paratype 2 - (MNHN-IM-2000-36044) 3.62 x 1.15 mm, protoconch 0.52 x 0.28 mm, stn DW2010.

### Type locality

Austral Is. (French Polynesia), Bank NE Rapa, 115-120 m, Expedition BENTHAUS 2002.

### Distribution

Known only from Austral Is. (French Polynesia).

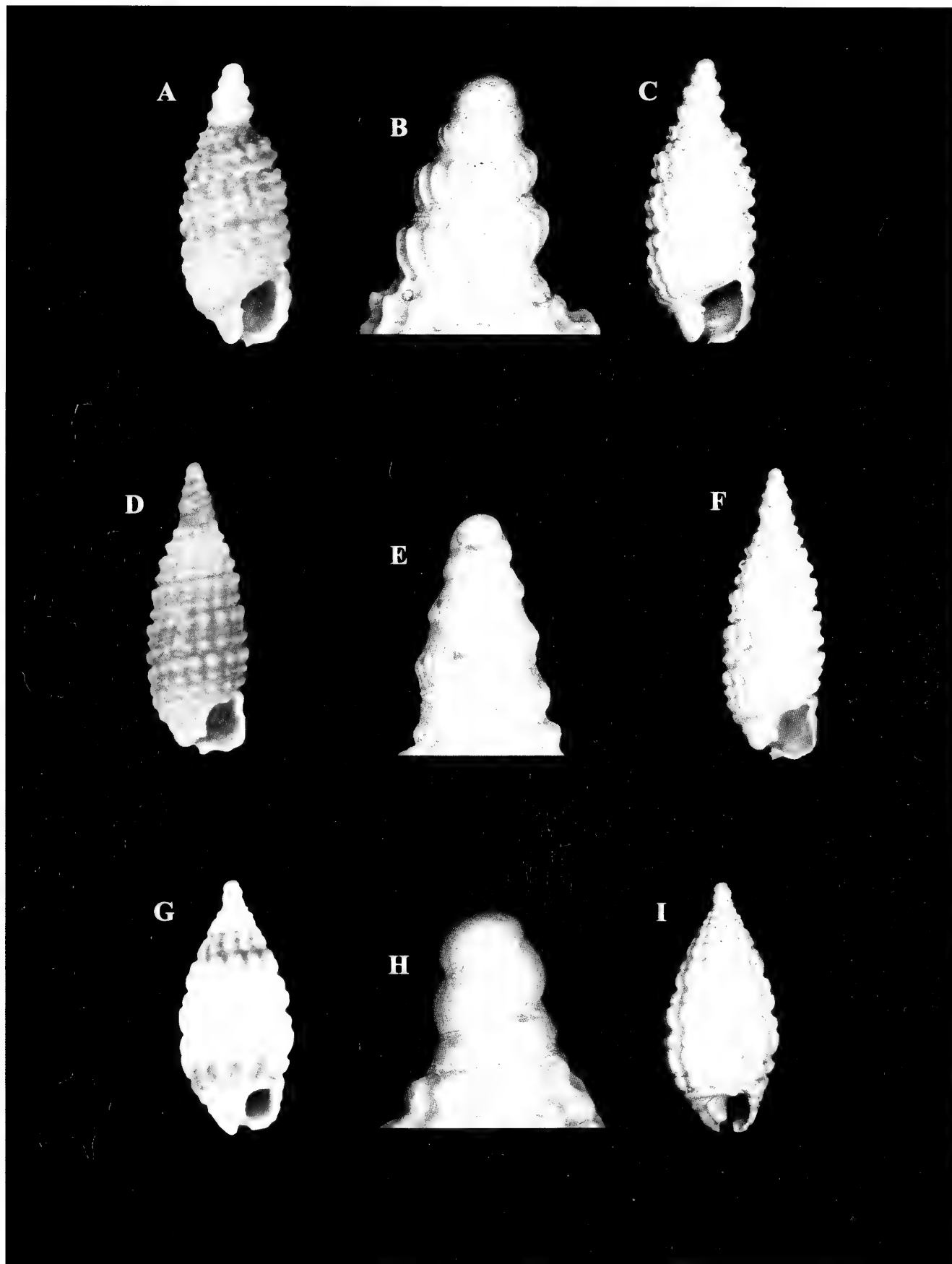
### Material examined

stn DW1901, Bank NE Rapa, 115-120 m, spms 3, Expedition BENTHAUS 2002.

### Description of holotype

Shell medium, conical with impressed sutures and slightly constricted base; colour pale brown. Protoconch





**Fig. 22. [Austral Is.]. A-C.** *Marshallopsis elvirarivae* n. sp., holotype (MNHN-IM-2000-36039), 1,70 x 0,42 mm, protoconch 0,41 x 0,25 mm, Neilson Reef, stn DW1925, **D-F.** *Marshallopsis frantagliaferroi* n. sp., holotype (MNHN-IM-2000-36040), 2,24 x 0,82 mm, protoconch 0,45 x 0,27 mm, President Thiers Bank, stn DW1932, **G-I.** *Marshallopsis giotagliaferroi* n. sp., holotype (MNHN-IM-2000-36041), 2,69 x 1,27 mm, protoconch 0,30 x 0,22 mm, Rimatara, stn DW2020

**Fig. 22. [Austral Is.]. A-C.** *Marshallopsis elvirarivae* n. sp., olotipo (MNHN-IM-2000-36039), 1,70 x 0,42 mm, protoconcha 0,41 x 0,25 mm, Neilson Reef, stn DW1925, **D-F.** *Marshallopsis frantagliaferroi* n. sp., olotipo (MNHN-IM-2000-36040), 2,24 x 0,82 mm, protoconcha 0,45 x 0,27 mm, President Thiers Bank, stn DW1932, **G-I.** *Marshallopsis giotagliaferroi* n. sp., oiotipo (MNHN-IM-2000-36041), 2,69 x 1,27 mm, protoconcha 0,30 x 0,22 mm, Rimatara, stn DW2020

## Type locality

Austral Is. (French Polynesia), Neilson Reef, 560-790 m.

## Distribution

Known only from Austral Is. (French Polynesia).

## Material examined

stn DW1925, Neilson Reef, 560-790 m, spm 1, Expedition BENTHAUS 2002; stn DW2020, Rimatara, 920-930 m, spm 1, Expedition BENTHAUS 2002.

## Description of holotype

Shell very small, subcylindrical with impressed sutures; colour sandy yellow. Protoconch conical of 4.5 convex whorls; seen under SEM first 1.5 embryonic whorls show an obsolete rough sculpture, initially sparse, in the final part arranged in 4 thin threads spirals; next whorl are smooth on the third upper part, on the lower show a sculpture of thin axial riblets; subsequent whorls in the upper third show 2 lines of microgranules, on the lower same sculpture of axial riblets (about 16 per whorl regularly spaced). Teleoconch of 3.75 slightly convex whorls with reticulate sculpture of 3 equal spiral cords crossed by weaker axial ribs, about 16 on last whorl; beads at each intersection. A fourth beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a cord. Columella short and broad, obliquely truncated, with surface crossed by thin crisp threads, columellar callus bordering an oval aperture; anal sulcus inconspicuous, siphonal canal well defined.

## Comparison

*Marshallopsis elvirarivae* n. sp. can be compared with various *Marshallopsis* species, we mention: *M. atrata* and *M. maesta* both Cecalupo & Perugia, 2012 from Philippines, *M. nagoensis* Cecalupo & Perugia, 2018 from Papua New Guinea, *M. varians* (Laseron, 1956) from Australia e *M. utriculus* 2017 from New Caledonia. It is distinguished above all by having more impressed sutures and a more prominent sculpture of the teleoconch that gives it a more rough appearance.

## Etymology

*elvirarivae*, after Elvira Riva wife of Massimo Tagliaferro our collaborator in the execution of SEM photos.

***Marshallopsis frantagliaferroi* n. sp.**  
(Fig. 22. D-F)

## Type material

holotype - (MNHN-IM-2000-36040) 2.24 x 0.82 mm, protoconch 0.45 x 0.27 mm, stn DW1932.

## Type locality

Austral Is. (French Polynesia), President Bank, 500-800 m.

## Distribution

Known only from Austral Is. (French Polynesia).

## Material examined

stn DW1932, President Thiers Bank, 500-800 m, spm 1, Expedition BENTHAUS 2002.

## Description of holotype

Shell small, conical with impressed sutures, slightly constricted base. Protoconch conical of 4.5 convex whorls; seen under SEM first 1.5 embryonic whorls smooth, subsequent whorls in the upper half show 2 lines of microgranules, on the lower a sculpture of axial riblets (about 24 per whorl regularly spaced). Colour yellowish. Teleoconch of 5 whorls with reticulate sculpture: in the first whorls of 2 spiral cords (1<sup>st</sup> bigger), in the penultimate whorl a 3<sup>rd</sup> intermediate cord emerges. Spiral cords crossed by weaker axial ribs, about 16 on last whorl; beads at each intersection. A fourth beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a weak groove. Columella short and broad, obliquely truncated, with surface crossed by thin threads, columellar callus bordering an oval aperture; anal sulcus and siphonal canal well defined. Colour pale orange with 1<sup>st</sup> spiral cord paler; 1<sup>st</sup> whorl and aperture whitish.

## Comparison

*Marshallopsis frantagliaferroi* n. sp. is compared with *Marshallopsis tutubensis* Cecalupo & Perugia, 2013 from Vanuatu similar in colour but with protoconch shorter and a shape more inflated. It can be more easily confused with *Horologica diana* n. sp. here reported, which has a very similar shape, sculpture of the teleoconch and colour but with the protoconch smooth not sculptured as in the genus *Marshallopsis*.

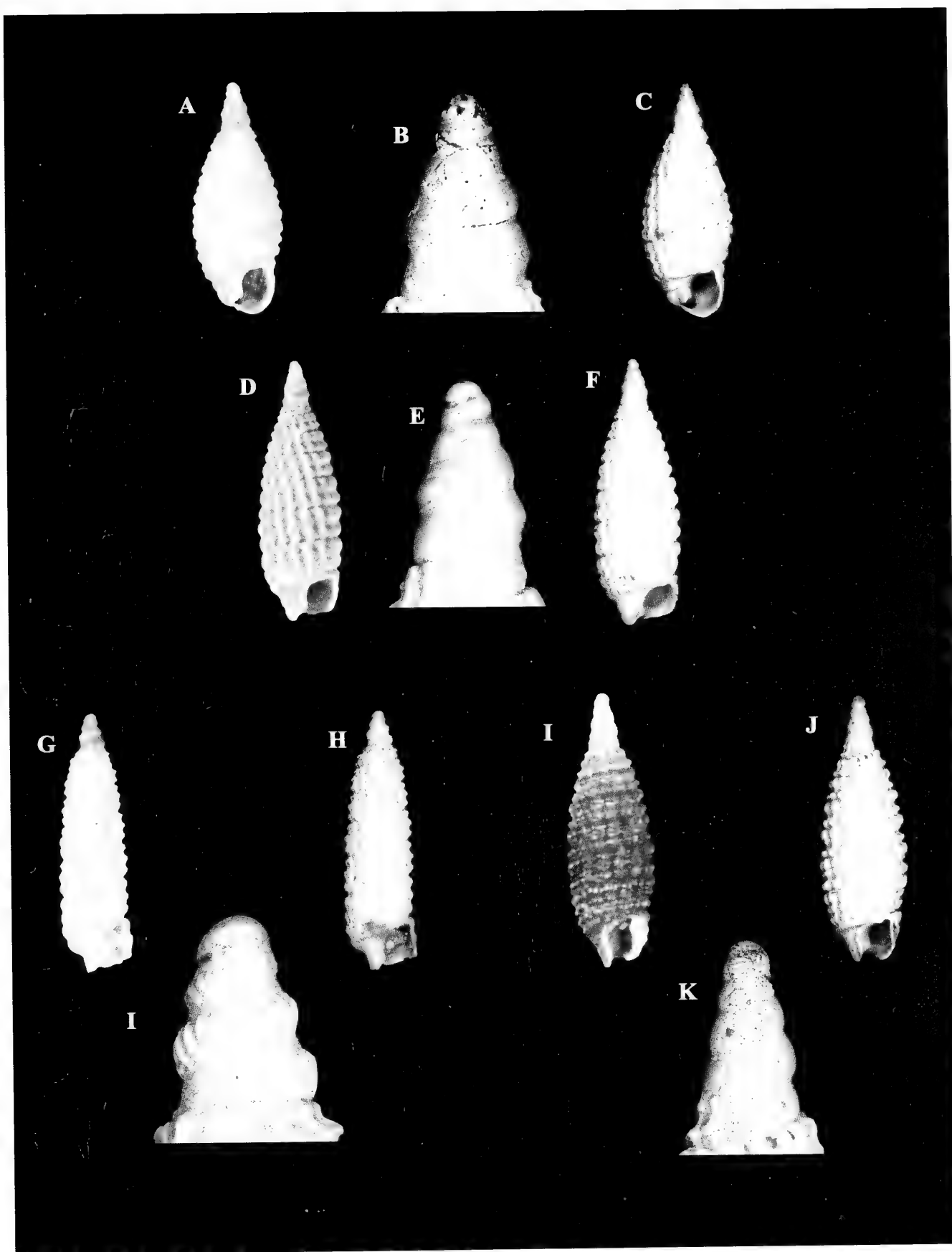
## Etymology

*frantagliaferroi*, after Francesca daughter of Massimo Tagliaferro our collaborator in the execution of SEM photos.

***Marshallopsis giotagliaferroi* n. sp.**  
(Fig. 22. G-I)

## Type material

holotype - (MNHN-IM-2000-36041) 2.69 x 1.27 mm, protoconch 0.30 x 0.22 mm, stn DW2020.



**Fig. 21. [Austral Is.].** **A-C.** *Joculator lividus* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25528), 2,15 x 0,82 mm, protoconch 0,52 x 0,27 mm, E Rapa, stn DW1889; **D-F.** *Horologica* cfr. *siazei* Cecalupo & Perugia, 2017, 2,88 x 0,87 mm, protoconch 0,57 x 0,30 mm, Rimatara, stn DW2021; **G-I.** *Marshallopsis boucheti* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25530), 2,46 x 0,62 mm, protoconch 0,38 x 0,24 mm, President Thiers Bank, stn DW1932; **I-K.** *Horologica diana* holotype (MNHN-IM-2000-36038), 2,35 x 0,75, protoconch 0,55 x 0,25 mm, Bank NE Rapa, stn DW1901

**Fig. 21. [Austral Is.].** **A-C.** *Joculator lividus* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25528), 2,15 x 0,82 mm, protoconca 0,52 x 0,27 mm, E Rapa, stn DW1889; **D-F.** *Horologica* cfr. *siazei* Cecalupo & Perugia, 2017, 2,88 x 0,87 mm, protoconca 0,57 x 0,30 mm, Rimatara, stn DW2021; **G-I.** *Marshallopsis boucheti* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25530), 2,46 x 0,62 mm, protoconca 0,38 x 0,24 mm, President Thiers Bank, stn DW1932; **I-K.** *Horologica diana* oiotipo (MNHN-IM-2000-36038), 2,35 x 0,75, protoconca 0,55 x 0,25 mm, Bank a nord est di Rapa, stn DW1901

## Distribution

Indo-Pacific range.

## Material examined

stn DW1932, President Thiers Bank, spm 1, 500-800 m, Expedition BENTHAUS 2002.

## Remarks

First report from Austral Is.

*Horologica* cfr. *siazei*  
Cecalupo & Perugia, 2017  
(Fig. 21. D-F)

## Figured specimen

D-F 2.88 x 0.87 mm, protoconch 0.57 x 0.30 mm, stn DW2021.

## Type locality

Loyalty Is., Lifou, Santal Bay, 8-18 m.

## Distribution

Austral Is., Japan, Loyalty Is., New Caledonia.

## Material examined

Stn DW2021, Rimatara, 1200-1226 m, spm 1, Expedition BENTHAUS 2002.

## Remarks

The bad condition of the specimen makes the specific classification uncertain.

*Joculator lividus* Cecalupo & perugia, 2012  
(Fig. 21. A-C)

## Figured specimen

A-C - (MNHN-IM-2012-25528) 2.15 x 0.82 mm, protoconch 0.52 x 0.27 mm, stn DW1889.

## Type locality

Philippines, Panglao Is., Bingag/Tabalong, up to 80 m.

## Distribution

Indo-Pacific range.

## Material examined

stn DW1889, East Rapa, 600-620 m, spm 1, Expedition BENTHAUS 2002.

## *Joculator saguili*

Cecalupo & Perugia, 2013  
(not figured)

## Type locality

Vanuatu, Espiritu Santo Is., E Aoré Is., Aisiri Bay.

## Distribution

Indo-Pacific range.

## Material examined

stn DW1932, President Thiers Bank, 500-800 m, spm 1, Expedition BENTHAUS 2002.

## Remarks

First report from Austral Is.

*Marshallopsis boucheti*  
Cecalupo & Perugia, 2012  
(Fig. 21. G-I)

## Figured specimen

G-I - (MNHN-IM-2012-25530) 2.46 x 0.62 mm, protoconch 0.38 x 0.24 mm, stn DW1932.

## Type locality

Philippines, Panglao Is., Bingag/Tabalon, up to 80 m.

## Distribution

Indo-Pacific range.

## Material examined

stn DW1932, President Thiers Bank, 500-800 m, spm 1; stn 2020, Rimatara, 920-930 m, spm 1, Expedition BENTHAUS 2002.

## Remarks

The figured specimen has an unusual shape, elongated and cylindrical. First report from Austral Is.

*Marshallopsis elvirarivae* n. sp.  
(Fig. 22. A-C)

## Type material

holotype - (MNHN-IM-2000-36039) 1.70 x 0.42 mm, protoconch 0.41 x 0.25 mm, stn DW1925.

paratype 1 - (MNHN-IM-2000-35839) 1.37 x 0.62 mm, ptotonconch damaged, stn DW2020.

Comparison

*Specula angelobaraggiai* n. sp. is compared with *Specula dimatteoi* e *S. menoui* both Cecalupo & Perugia, 2017 from New Caledonia, with similar protoconch but larger in size, sutures less impressed and smaller, more acumined beads.

Etymology

*angelobaraggiai*, after Angelo Baraggia of Milano (Italy), member and secretary of the Milano Section of the Società Italiana di Malacologia (SIM).

*Specula puillandrei* Cecalupo & Perugia, 2013  
(Fig. 20. M-O)

Figured specimen

M-O - (MNHN-IM-2012-25536) 1.56 x 0.67 mm, protoconch 0.33 x 0.20 mm, stn DW1233.

Type locality

Vanuatu, NW coast of Malo Is., 78-91 m.

Distribution

Indonesia, New Caledonia, Papua New Guinea, Vanuatu.

Material examined

stn DW1233, Cap Woodin, 45-50 m, spms 4. Expedition LAGON.

PACIFIC OCEAN MATERIAL: AUSTRAL Is.

*Horologica diana*e n. sp.  
(Fig. 21. I-K)

Type material

holotype - (MNHN-IM-2000-36038) 2.35 x 0.75 mm, protoconch 0.55 x 0.25 mm, stn DW1901.

Type locality

Stn DW1901, Austral Is. (French Polynesia), Bank NE Rapa, 115-120 m.

Distribution

Known only from Austral Is. (French Polynesia).

Material examined

Stn DW1901, Bank NE Rapa, 115-120 m, spm 1, Expedition BENTHAUS 2002.

Description of holotype

Shell small, conical elongated, last whorls constricted, sutures moderately impressed. Protoconch slender, conical of 5.5 smooth whorls, colour yellowish. Teleoconch of about 7 whorls with reticulate sculpture of 2 spiral cords (2<sup>nd</sup> narrower), crossed by weaker axial ribs, 15 on last whorl; in the 4th whorls a thinner intermediate spiral cords emerges gradually better defined. Beads at each intersection, a 4th cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a weak angulation. Columella short and broad, obliquely truncated, crossed by thin crisp threads; columellar callus bordering a sub-circular aperture; siphonal canal and anus sulcus well defined, outer lip slightly damaged at the bottom. Colour orange.

Comparison

*Horologica diana*e n. sp. is compared with shells having similar sculpture of the teleoconch and slender protoconch: *H. fraudulenta* Cecalupo & Perugia, 2013 from Vanuatu larger (2.78 x 6.5 whorls), more inflated and a protoconch of only 4.5 whorls; *H. interiecta* Cecalupo & Perugia, 2016 from Egyptian coasts of the Red Sea and *H. forlii* Cecalupo & Perugia, 2019 from Indonesia, Bangka Is, N Sulawesi, both similar in shape and colour but without intermediate spiral cords.

Etymology

*diana*e, dedicated to Diana Viti of Matera (Italy).

*Horologica gregaria*  
Cecalupo & Perugia, 2012  
(not figured)

Type locality

Philippines, Mactan Is., Olango Channel, 60-80 m.

Distribution

Indo-Pacific range.

Material examined

stn DW2010, Rurutu, south coast, 520-950 m, spm 1, Expedition BENTHAUS 2002.

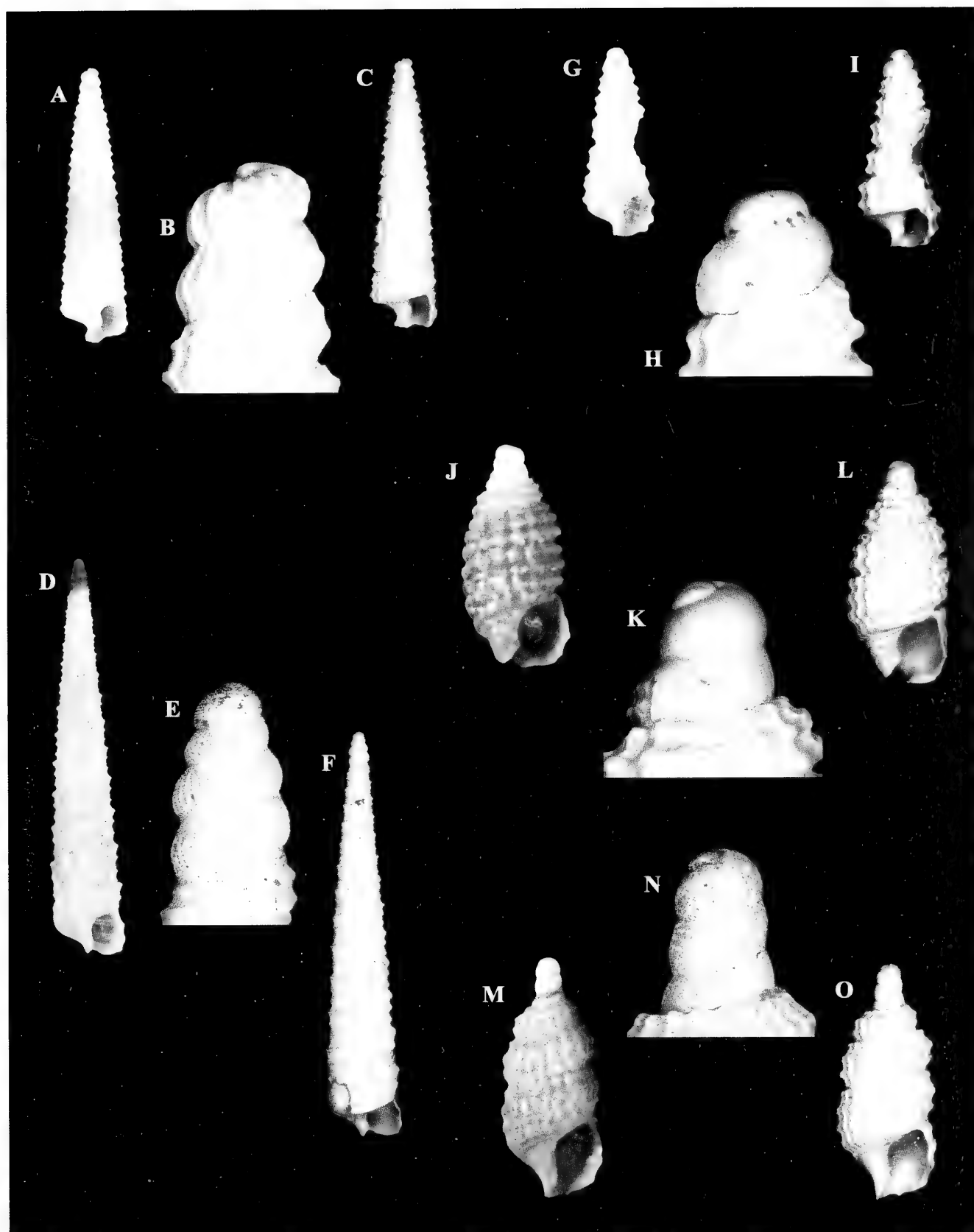
Remarks

First report from Austral Is.

*Horologica jayi* Cecalupo & Perugia, 2012  
(not figured)

Type locality

Philippines, Mactan Is., Olango Channel, 60-80 m.



**Fig. 20. [New Caledonia]. A-C.** *Retilaskeya albanoi* n. sp., holotype (MNHN-IM-2000-36052), 5.40 x 1.40 mm, protoconch 0.55 x 0.44 mm, Cap N'Doua, stn DW1235; **D-F.** *Seila elegantissima* Marshall, 1978 (MNHN-IM-2012-25535), 6.85 x 1.25 mm, protoconch 0.70 x 0.35 mm, South Bank Nova, stn DW2530; **G-I.** *Specula jemeauensis* n. sp., holotype (MNHN-IM-2000-36054), 1.82 x 0.72 mm, protoconch 0.24 x 0.27 mm, E Bank Jumeau, stn DW2049; **J-L.** *Specula angelobaraggiai* n. sp. holotype (MNHN-IM-2000-36055), 1.39 x 0.65 mm, protoconch 0.24 x 0.18 mm, W Ile de Pins, stn CP4658, **M-O.** *Specula puillandre* Cecalupo & Perugia, 2013 (MNHN-IM-2012-25536), 1.56 x 0.67 mm, protoconch 0.33 x 0.20 mm, Cap Woodin, stn DW1233

**Fig. 20. [New Caledonia]. A-C.** *Retilaskeya albanoi* n. sp., olotipo (MNHN-IM-2000-36052), 5,40 x 1,40 mm, protoconca 0,55 x 0,44 mm, Cap N'Doua, stn DW1235, **D-F.** *Seila elegantissima* Marshall, 1978 (MNHN-IM-2012-25535), 6,85 x 1,25 mm, protoconca 0,70 x 0,35 mm, South Bank Nova, stn DW2530, **G-I.** *Specula jemeauensis* n. sp., olotipo (MNHN-IM-2000-36054), 1,82 x 0,72 mm, protoconca 0,24 x 0,27 mm, E Bank Jumeau, stn DW2049, **J-L.** *Specula angelobaraggiai* n. sp. olotipo (MNHN-IM-2000-36055), 1,39 x 0,65 mm, protoconca 0,24 x 0,18 mm, W Ile de Pins, stn CP4658, **M-O.** *Specula puillandre* Cecalupo & Perugia, 2013 (MNHN-IM-2012-25536), 1,56 x 0,67 mm, protoconca 0,33 x 0,20 mm, Cap Woodin, stn DW1233

Vanuatu and Papua New Guinea (Niugini Yabod Is.), both having teleoconch with similar shape and shorter protoconch without spiral threads. *R. papuaensis* Cecalupo & Perugia, 2018 from Papua New Guinea (Niugini), has similar protoconch but very different teleoconch.

## Etymology

*albanoi*, after Paolo Giulio Albano, Department of Palaeontology, University of Vienna, Austria.

***Seila elegantissima*** Marshall, 1978  
(Fig. 20. D-F)

## Figured specimen

D-F - (MNHN-IM-2012-25535) 6.85 x 1.25 mm, protoconch 0.70 x 0.35 mm, stn DW2530.

## Type locality

New Zealand, Bay of Islands and off Mayor Is., 29-73 m.

## Distribution

New Caledonia, New Zealand.

## Material examined

stn DW2530, South Bank Nova, 338-343 m, spm 1, Expedition EBISCO.

***Specula jemeauensis*** n. sp.  
(Fig. 20. G-I)

## Type material

holotype - (MNHN-IM-2000-36054) 1.82 x 0.72 mm, protoconch 0.24 x 0.27 mm, stn DW2049.

## Type locality

New Caledonia, E Bank Jumeau, 470-621 m.

## Distribution

Known only from type locality.

## Material examined

stn DW2049, E Bank Jumeau, 470-621 m, spm 1, Expedition NORFOLK 2.

## Description of holotype

Shell very small, incomplete may be a juvenile specimen, colour white. Protoconch small, bulbous of 2 convex whorls; under SEM apex smooth dome-shaped,

next granulous. Teleoconch of 5.5 whorls, damaged laterally by a predation hole, with reticulate sculpture of 2 spiral cords crossed by axial ribs, about 12 on last whorl, beads at each intersection. A 4<sup>th</sup> cord at the base of last whorl emerging from insertion of outer lip; aperture incomplete.

## Comparison

*Specula jemeauensis* n. sp. it is rather similar to *Specula puillandrei* Cecalupo & Perugia, 2013 from Vanuatu, also reported from New Caledonia; the main difference is in the sculpture of the teleoconch with only 2 spiral cords and with the same number of whorls it is shorter (1.82 vs 2.42). The protoconch has the 1<sup>st</sup> whorl smooth and the 2<sup>nd</sup> granulous while in *S. puillandrei* it is exactly the opposite. *Specula jemeauensis* n. sp. has been found at strong depth while the specimens of *S. puillandrei* are reported between 25-100 m depth.

## Etymology

*jemeauensis*, from type locality.

***Specula angelobaraggiai*** n. sp.  
(Fig. 20. J-L)

## Type material

holotype - (MNHN-IM-2000-36055) 1.39 x 0.65 mm, protoconch 0.24 x 0.18 mm, stn CP4658.

## Type locality

New Caledonia, W Ile de Pins, 303-315 m.

## Distribution

Known only from type locality.

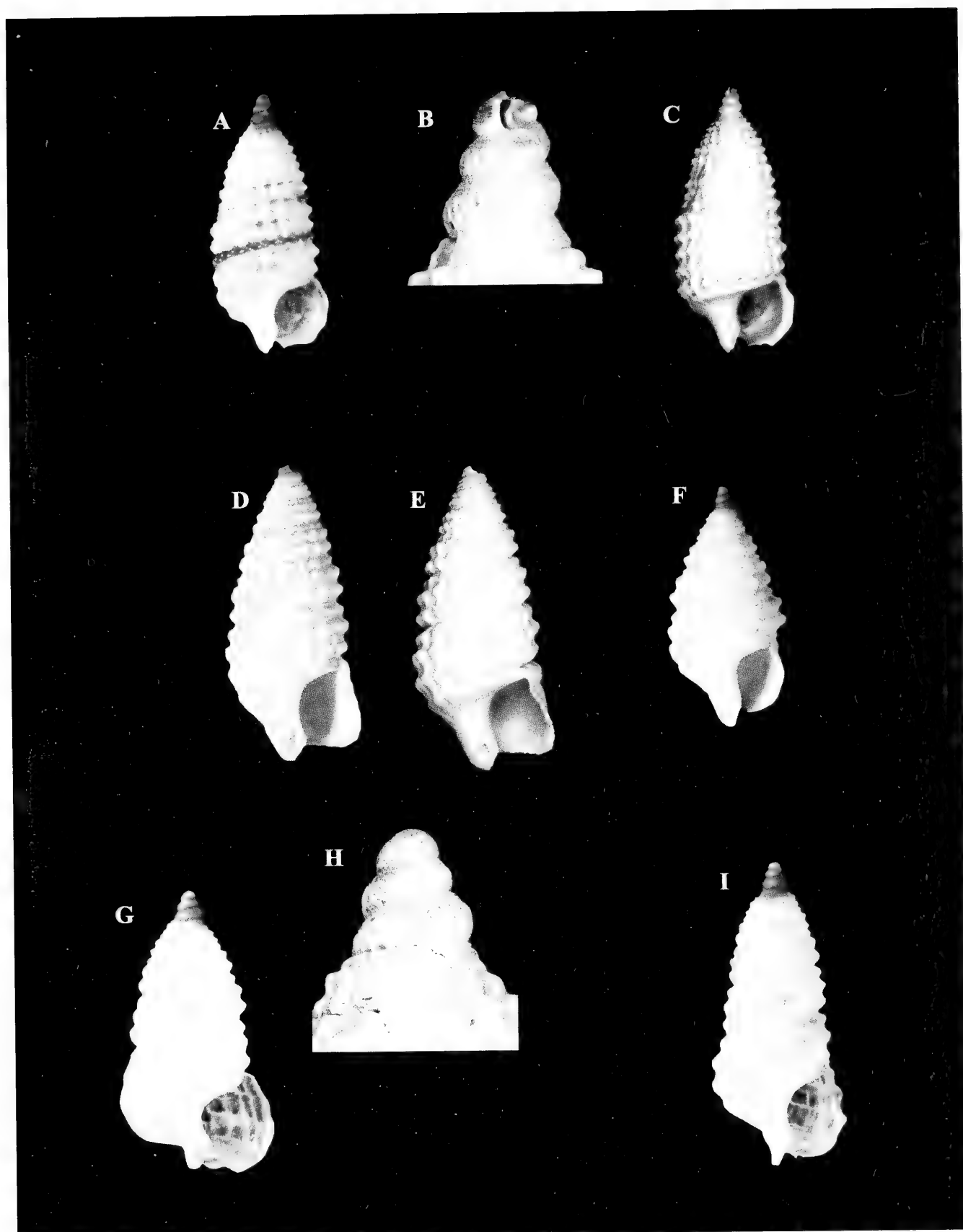
## Material examined

stn CP4658, W Ile de Pins, 303-315 m, spm 1, Expedition KANOCONO.

## Description of holotype

Shell very small, oval, sutures moderately impressed, last whorls slightly constricted. Protoconch small, conical of 2.5 smooth convex whorls, colour white, opaque. Teleoconch of 3,5 whorls with reticulate sculpture of 3 spiral cords (1<sup>st</sup> narrower) crossed by weaker axial ribs, about 18 on last whorl; beads at each intersection. A 4<sup>th</sup> beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a cord. Columella short crossed by crisp thin threads, anal sulcus and siphonal canal well evident, columellar callus bordering a oval aperture. Colour orange.





**Fig. 19. [New Caledonia; Papua New Guinea]. A-C.** *Prolixodens alba* Cecalupo & Perugia, 2017 (MNHN-IM-2012-25540), 3,21 x 1,37 mm, protoconch 0,41 x 0,29 mm, New Caledonia, Ride de Norfolk, Banc Esponge, stn DW2084, **D-E.** *Prolixodens alba*, 4,45 x 1,90 mm (MNHN-IM-2012-25538), Papua New Guinea, Vitiaz Strait, stn. DW3719, **F.** *Prolixodens alba*, 3,90 x 1,90 mm, (MNHN-IM-2012-25539), Papua New Guinea, Vitiaz Strait, stn DW3719, **G-H.** *Prolixodens alba*, holotype (MNHN-IM-2000-30637), 3,28 x 1,64 mm, protoconch 0,44 x 0,32 mm, South New Caledonia, stn DW1733, **I.** *Prolixodens alba*, paratype 1 (MNHN-IM-2000-30638), 3,69 x 1,60 mm, South New Caledonia, stn DW1733.

**Fig. 19. [New Caledonia; Papua New Guinea]. A-C.** *Prolixodens alba* Cecalupo & Perugia, 2017 (MNHN-IM-2012-25540), 3,21 x 1,37 mm, protoconch 0,41 x 0,29 mm, New Caledonia, Ride de Norfolk, Banc Esponge, stn DW2084, **D-E.** *Prolixodens alba*, 4,45 x 1,90 mm (MNHN-IM-2012-25538), Papua New Guinea, Vitiaz Strait, stn. DW3719, **F.** *Prolixodens alba*, 3,90 x 1,90 mm, (MNHN-IM-2012-25539), Papua New Guinea, Vitiaz Strait, stn DW3719, **G-H.** *Prolixodens alba*, olotipo (MNHN-IM-2000-30637), 3,28 x 1,64 mm, protoconca 0,44 x 0,32 mm, a sud della New Caledonia, stn DW1733, **I.** *Prolixodens alba*, paratype 1 (MNHN-IM-2000-30638), 3,69 x 1,60 mm, a sud della New Caledonia, stn DW1733.

## Material examined

stn DW1233, Cap Woodin, 45-50 m, spm 1. Expedition LAGON.

## Description of holotype

Shell very small, oval, moderately impressed sutures; under SEM is completely covered with an unknown opacifying material such as a transparent periostracum. Protoconch dome-shaped of 2 smooth convex whorls; embryonic whorl opaque white, next sandy orange. Teleoconch of 3 whorls with reticulate sculpture arranged in 3 large spiral bands (1<sup>st</sup> less prominent), crossed by 16 predominant axial ribs. A 4<sup>th</sup> beaded cord at the base of last whorl emerging from insertion of outer lip. Columella short, anal sulcus and siphonal canal evident, columellar callus bordering an oval aperture. Colour sandy orange.

## Comparison

The genus *Potenatomus* was instituted by Laseron 1956 for two Cerithiopsidae of North Australia with the following diagnosis "like *Horologica* Laseron, 1956 in form and sculpture, but minute, of few whorls, and with a large tumid protoconch of 1½ whorls". *Potenatomus woodinensis* n. sp. can be compared with *Potenatomus secundus* Laseron, 1956 which differs mainly in size by having 5 whorls vs 3, in the sutures not distinguishable, and in the sculpture of the teleoconch, beaded keels vs large beaded spiral band.

## Etymology

*woodinensis*, from Woodin, type locality.

***Prolixodens alba*** Cecalupo & Perugia, 2017  
(Fig. 19. A-I)

## Figured specimens

A-C - (MNHN-IM-2012-25540) 3.21 x 1.37 mm, protoconch 0.41 x 0.29 mm, stn DW2084, Expedition NORFOLK 2.

D-E - (MNHN-IM-2012-25538) 4.45 x 1.90 mm, stn DW3719, Expedition BIOPAPUA.

F - (MNHN-IM-2012-25539) 3.90 x 1.90 mm, stn DW3719, Expedition BIOPAPUA.

G-H - **holotype** (MNHN-IM-2000-30637), 3.28 x 1.64 mm, protoconch 0.44 x 0.32, south New Caledonia stn DW1733.

I - Paratype 1 (MNHN-IM-2000-30638), 3.69 x 1.60 mm, south New Caledonia stn DW1733.

## Type locality

South New Caledonia.

## Distribution

New Caledonia, Papua New Guinea.

## Material examined

Papua New Guinea, stn DW3719, Vitiaz Strait, 410 m, spms 2, Expedition BIOPAPUA; New Caledonia, stn DW2084, Ride de Norfolk, Banc Esponge, 586-730 m, spms 25.

## Remarks

1st report from Papua New Guinea. The species from New Caledonia, already reported in Cecalupo & Perugia, 2016, shows a colour variation with the first spiral cord of the teleoconch dark orange.

***Retilaskeya albanoi*** n. sp.  
(Fig. 20. A-C)

## Type material

holotype - (MNHN-IM-2000-36052) 5.40 x 1.40 mm, protoconch 0.55 x 0.44 mm, stn DW1235.

paratype 1 - (MNHN-IM-2000-36053) 5.13 x 1.72 mm, protoconch 0.54 x 0.45 mm, stn DW1235.

## Type locality

New Caledonia, Cap N'Doua, 51-52 m.

## Distribution

Known only from type locality.

## Material examined

stn DW1235, Cap N'Doua, 51-52 m, spms 2, Expedition LAGON.

## Description of holotype

Shell medium, conical regularly increasing with flat sides, moderately distinct sutures, base excavate: colour whitish, opaque. Protoconch conical of 2.5-3 convex whorls sculptured by 16 prominent axial riblets; transition to teleoconch indefinable. Teleoconch of 11 whorls with reticulate sculpture of 2 spiral cords, a third weaker intermediate cord begins to appear from the seventh whorl. Spirals crossed by axial ribs, flat and larger than spirals, about 14 on last whorl; beads at each intersection. Under SEM all the surface of the shell crossed by fine close-set axial threads. A fourth cord at the base of last whorl emerging from insertion of outer lip. Columella short, aperture subquadrate, no columellar callus, siphonal canal well defined, outer lip thin, indented by the sculpture of the teleoconch.

## Comparison

*Retilaskeya albanoi* n. sp. it is easily distinguishable from *Retilaskeya reunionensis* Jay & Drivas, 2002 from La Reunion, and *R. rufocincta* Cecalupo & Perugia, 2013 from



**Fig. 18. [New Caledonia]. A-C.** *Joculator sbranai* n. sp., holotype (MNHN-IM-2000-36050), 1.84 x 0.60 mm, protoconch 0.40 x 0.22 mm, Nouméa area, between Ilot Maitre & Larégnere, stn 1334, **D-F.** *Mendax barbarae* Cecalupo & Perugia, 2017 (MNHN-IM-2012-25534), 4.37 x 1.25 mm, protoconch 0.35 x 0.31 mm, betw Chesterfield & Bellona Plateau, stn DW5028, **G-I.** *Potenatonus woodinensis* n. sp., holotype (MNHN-IM-2000-36051), 1.17 x 0.51 mm, protoconch 0.25 x 0.25 mm, Cap Woodin, stn DW1233

**Fig. 18. [New Caledonia]. A-C.** *Joculator sbranai* n. sp., olotipo (MNHN-IM-2000-36050), 1,84 x 0,60 mm, protoconca 0,40 x 0,22 mm, Noumea area, tra Ilot Maitre & Laregnere, stn 1334, **D-F.** *Mendax barbarae* Cecalupo & Perugia, 2017 (MNHN-IM-2012-25534), 4,37 x 1,25 mm, protoconca 0,35 x 0,31 mm., betw Chesterfield & Bellona Plateau, stn DW5028, **G-I.** *Potenatonus woodinensis* n. sp., olotipo (MNHN-IM-2000-36051), 1,17 x 0,51 mm, protoconca 0,25 x 0,25 mm, Cap Woodin, stn DW1233

cords crossed by weaker axial ribs, about 16 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a cord and a groove. Columella short and broad, obliquely truncated, columellar callus bordering an oval aperture; siphonal canal well defined. Colour white semitransparent with 1<sup>st</sup> and 3<sup>rd</sup> spiral cords pale orange.

### Comparison

*Joculator savellii* n. sp. is compared with 2 very similar species having a background colour white, semitransparent but with a single yellow spiral cord; *Joculator fedosovi* Cevalupo & Perugia, 2018 from Niugini, Papua New Guinea, differs in being shorter with 18 axial ribs, *Specula molini* Cevalupo & Perugia, 2013 from Vanuatu, has shorter protoconch and less impressed sutures.

### Etymology

*savellii*, after Riccardo Giannuzzi Savelli of Palermo (Italy) member and ex President of the Società Italiana di Malacologia (SIM).

***Joculator sbranai* n. sp.**  
(Fig. 18. A-C)

### Type material

holotype - (MNHN-IM-2000-36050) 1.84 x 0.60 mm, protoconch 0.40 x 0.22 mm, stn 1334.

### Type locality

New Caledonia, Nouméa area: between Ilot Maitre & Larégnère, 16 m.

### Distribution

Known only from type locality.

### Material examined

stn 1334, Nouméa area: between Ilot Maitre & Larégnère, 16 m.

### Description of holotype

Shell very small, conical, moderately impressed sutures, vitreous, colorless, semitransparent. Protoconch conical of 4.5 convex whorls, under SEM the embryonic whorl shows in the lower part a thin granulation, subsequent whorls have a thin thread above the suture. Teleoconch of 4.5 slightly convex whorls with reticulate sculpture of 3 spiral cords crossed by weaker axial ribs, about 18 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a

weaker cord. Columella short and broad, obliquely truncated, crossed by several wrinkled cords, columellar callus bordering an oval aperture; siphonal canal and anal sulcus well defined.

### Comparison

*Joculator sbranai* n. sp. can be compared with *Joculator garianii* and *J. semiperlucidus*, both Cevalupo & Perugia, 2013 also reported by Vanuatu Is.: the first similar in size, but different in colour, yellowish and semitransparent, having a smooth protoconch and a sculpture of the teleoconch with 2<sup>nd</sup> spiral cord very narrower, the second is similar in colour, white and semitransparent, but differs having a smooth protoconch, a shape more inflated and the sculpture of the teleoconch with 2<sup>nd</sup> spiral cord very narrower.

### Etymology

*sbranai*, after Carlo Sbrana member of the Società Italiana di Malacologia (SIM).

***Mendax barbarae* Cevalupo & Perugia, 2017**  
(Fig. 18. D-F)

### Material figured

D-F - (MNHN-IM-2012-25534) 4.37 x 1.25 mm, protoconch 0.35 x 0.31 mm, stn DW5028.

### Type locality

South New Caledonia, 124 m.

### Distribution

New Caledonia.

### Material examined

stn DW5028, Betw. Chesterfield & Bellona Plateau, 420-450 m, spm 1, Expedition KANADEEP.

***Potenatonus woodinensis* n. sp.**  
(Fig. 18. G-I)

### Type material

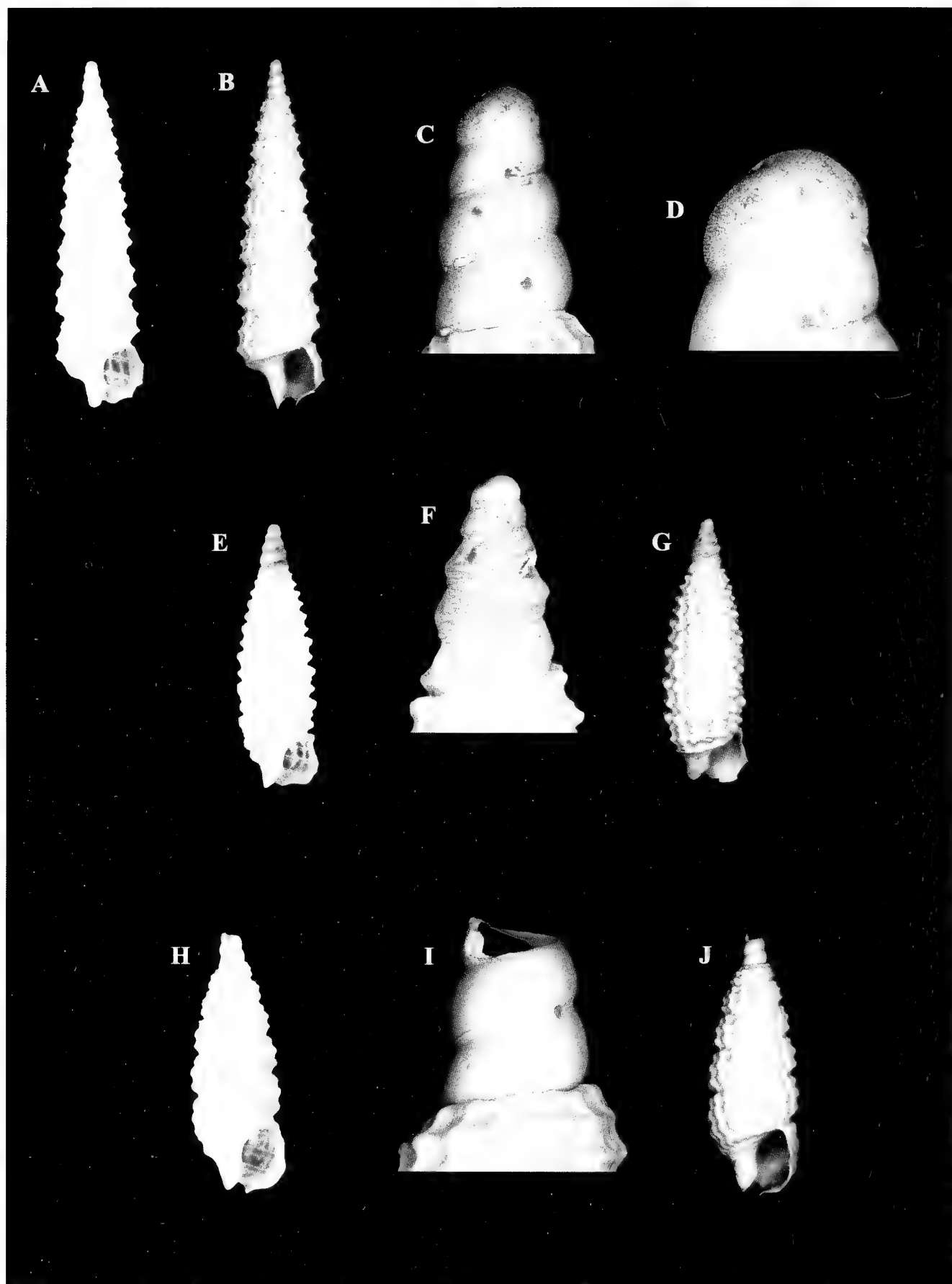
holotype - (MNHN-IM-2000-36051) 1.17 x 0.51 mm, protoconch 0.25 x 0.25 mm, stn DW1233.

### Type locality

New Caledonia, Cap Woodin, 45.50 m.

### Distribution

Known only from type locality.



**Fig. 17. [New Caledonia]. A-D.** *Clathropsis pallens* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25533), 4,37 x 1,12 mm, protoconch 0,57 x 0,25 mm, SW Ile des Pins, stn DW4706; *Horologica pusaterii* n. sp., holotype (MNHN-IM-2000-36048), 2,64 x 0,80 mm, protoconch 0,50 x 0,27 mm, South Lansdowne, stn DW2631, **H-J.** *Joculator savelli* n. sp., holotype (MNHN-IM-2000-36049), 2,36 x 0,79 mm, W Ile des Pins, stn CP4658

**Fig. 17. [New Caledonia]. A-D.** *Clathropsis pallens* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25533), 4,37 x 1,12 mm, protoconca 0,57 x 0,25 mm, a sud ovest di Ile des Pins, stn DW4706, *Horologica pusaterii* n. sp., olotipo (MNHN-IM-2000-36048), 2,64 x 0,80 mm, protoconca 0,50 x 0,27 mm, a sud di Lansdowne, stn DW2631, **H-J.** *Joculator savelli* n. sp., olotipo (MNHN-IM-2000-36049), 2,36 x 0,79 mm, a ovest di Ile des Pins, stn CP4658

transparent. Teleoconch of 8.5 whorls with spiral sculpture of 3 spiral cords (2<sup>nd</sup> narrower and less prominent), spiral interspaces crossed by fine close-set axial threads. A fourth cord at the base of last whorl emerging from insertion of outer lip. Shell juvenile with incomplete aperture. Background colour orange.

### Remarks

Shell juvenile with protoconch damaged and incomplete aperture; It is a new species, we prefer to wait for further specimens.

## PACIFIC OCEAN MATERIAL: NEW CALEDONIA

*Clathropsis pallens* Cecalupo & Perugia, 2012  
(Fig. 17. A-D)

### Figured specimen

A-D - (MNHN-IM-2012-25533) 4.37 x 1.12 mm, protoconch 0.57 x 0.25 mm, stn DW4706.

### Type locality

Philippines, Pamilacan Is., 2-4 m.

### Distribution

New Caledonia, Philippines, Vanuatu.

### Material examined

stn DW4706, SW Ile des Pins, 343-355 m, spm 1, Expedition KANOCONO.

*Horologica pusaterii* n. sp.  
(Fig. 17. E-G)

*Horologica* sp. in Cecalupo & Perugia, 2017: pag. 44, pl. 19, fig 3a-c.

### Type material

holotype - (MNHN-IM-2000-36048) 2.64 x 0.80 mm, protoconch 0.50 x 0.27 mm, stn DW2631.

### Type locality

New Caledonia, S Lansdowne, 372-404 m.

### Distribution

Known only from New Caledonia.

### Material examined

stn DW2631, South Lansdowne, 372-404 m, spms 3, Expedition EBISCO.

### Description of holotype

Shell small, conical inflated, last whorls constricted, sutures moderately impressed. Protoconch conical of 4.5 smooth whorls; see under SEM a submedian carena highlighted the angled convexity of the whorls; colour orange. Teleoconch of 6.5 whorls with reticulate sculpture of 2 spiral cords (1<sup>st</sup> less prominent) crossed by weaker axial ribs, about 14 on last whorl; in the last 2 whorls a thinner intermediate spiral cords emerges. Beads at each intersection, a fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a weak angulation. Columella short and broad, obliquely truncated, crossed by thin crisp threads, columellar callus bordering a sub-circular aperture; siphonal canal and anus sulcus well defined. Colour white, opaque.

### Remarks

This species has already been reported as *Horologica* sp. in Cecalupo & Perugia, 2017: pag. 44, pl. 19, fig. 3a-c from Norfolk Ridge, between 507-967 m depth. Its protoconch is similar to that of *Joculator saguili* Cecalupo & Perugia, 2013, Vanuatu, from which it differs for the sculpture of the teleoconch of only 2 spiral cords.

### Etymology

*pusaterii*, after Francesco Pusateri of Palermo (Italy), member of the Società Italiana di Malacologia (SIM).

*Joculator savellii* n. sp.  
(Fig. 17. H-J)

### Type material

holotype - (MNHN-IM-2000-36049) 2.36 x 0.79 mm, protoconch damaged, stn CP4658.

### Type locality

New Caledonia, W Is. des Pins, 303-315 m.

### Distribution

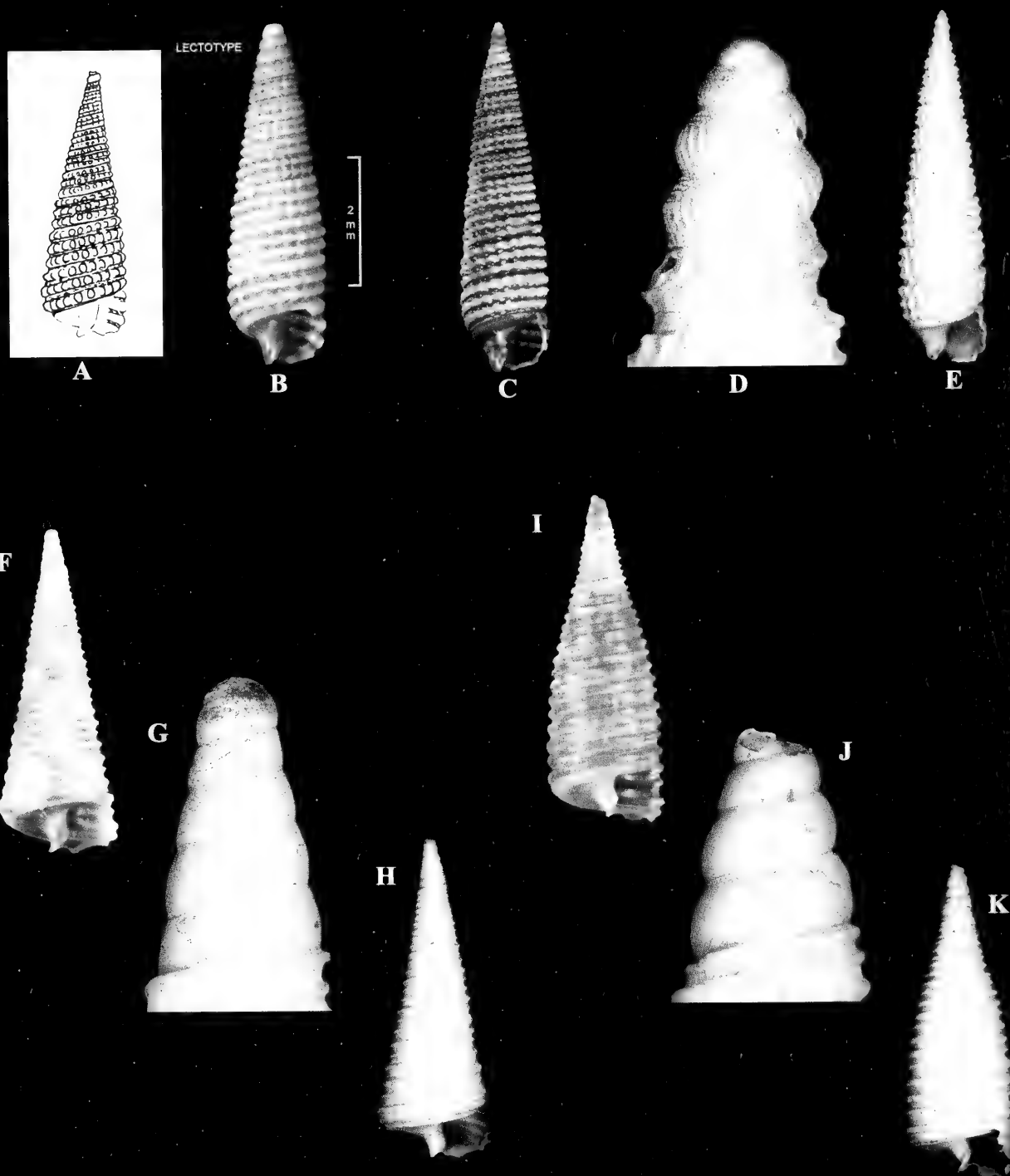
Known only from type locality.

### Material examined

stn CP4658, W Is. des Pins, 303-315 m, spm 1, Expedition KANOCONO.

### Description of holotype

Shell small, conical inflated, impressed sutures. Protoconch conical of 3.5-4.5 convex whorls, embryonic whorls missing; colour white, opaque. Under SEM shows a thin cord immediately above the sutures. Teleoconch of 5.3 convex whorls with reticulate sculpture of 3 spiral



**Fig. 16. [Western Australia].** **A.** *Cerithium infracolor* Laseron, 1951: 357, pl. 36. fig. 13, holotype, off Long Reef, Collaroy, NSW; **B.** *Prolixodens infracolor* (Laseron, 1951), lectotype, (AMS C.102748), off Long reef, Collaroy, NSW; **C-E.** *Prolixodens infracolor* (Laseron, 1951), (WAM), 5.76 x 1.47 mm, protoconch 0.51 x 0.30 mm, Esperance, Rabbit Is., SW side, stn WE09; **F-H.** *Seila slacksmithae* n. sp., holotype (WAM), 3.85 x 1.40 mm, protoconch 0.72 x 0.35 mm, Albany, Mistaken Is., King George Sound, stn WA13; **I-K.** *Seila* sp., (WAM), 3.96 x 1.38 mm, Albany, Mistaken Is., King George Sound, stn WA13

**Fig. 16. [Western Australia].** **A.** *Cerithium infracolor* Laseron, 1951: 357, pl. 36. fig. 13, olotipo, al largo del Long Reef, Collaroy, NSW; **B.** *Prolixodens infracolor* (Laseron, 1951), lectotipo, (AMS C.102748), al largo del Long reef, Collaroy, NSW; **C-E.** *Prolixodens infracolor* (Laseron, 1951), (WAM), 5.76 x 1.47 mm, protoconcha 0.51 x 0.30 mm, Esperance, Rabbit Is., lato a sud ovest, stn WE09; **F-H.** *Seila slacksmithae* n. sp., olotipo (WAM), 3.85 x 1.40 mm, protoconcha 0.72 x 0.35 mm, Albany, Mistaken Is., King George Sound, stn WA13; **I-K.** *Seila* sp., (WAM), 3.96 x 1.38 mm, Albany, Mistaken Is., King George Sound, stn WA13



Australia), a participant in several MNHN coastal expeditions and the organizer and sponsor of the 2011 field trip that collected several new *Cerithiopsis* species.

***Prolixodens infracolour*** (Laseron, 1951)  
(Fig. 16. A-E)

*Cerithiopsis infracolour* Laseron, 1951: 357, pl. 36, fig. 13, Lectotype.  
*Tuberclipsis infracolour* Laseron, 1956: 155.  
*Prolixodens infracolour* Marshall, 1978: 91, fig. 3MN, 4EF, 15H-JL, table 24.

**Figured specimen**

C-E - (WAM) 5.76 x 1.47 mm, protoconch, 0.51 x 0.30 mm, stn WE09.

**Type locality**

Australia, NSW off Long reef.

**Distribution**

Australia (NSW), New Zealand (North Island).

**Material examined**

Stn WA11, Albany, south side Possession Point, King George Sound, 7 m, spms 2; stn WA20, Albany, Seal Is., King George Sound, 4-12 m, spms 6; stn WE04, Esperance, Woody Is., Anchorage at NE corner, 11 m, spms 18; stn WE09, Esperance, Rabbit Is., SW side, 12-25 m, spms 3.

***Seila slacksmithae*** n. sp.  
(Fig. 16. F-H)

**Type material**

holotype - (WAM) 3.85 x 1.40 mm, protoconch 0.72 x 0.35 mm, stn WA13.  
paratype 1 - (WAM) 4.17 x 1.56 mm, protoconch 0.73 x 0.35 mm, stn WA13.  
paratype 2 - (WAM) 5.20 x 1.55 mm, protoconch missing, stn WA20.

**Type locality**

Western Australia, Albany, Mistaken Is., King George Sound, 10 m.

**Distribution**

Known only from type locality

**Material examined**

stn WA13, Albany, Mistaken Is., King George Sound, 10 m, spms 2; stn WA20, Busselton, Cape Naturalist, Yal-

lingup, 0-1 m, intertidal, spms 2; WB32, Busselton, Cape Naturalist, Eagle Bay, 5-15 m, spm 1.

**Description of holotype**

Shell medium, juvenile, conical with flat sides, sutures not discernible, base excavate. Protoconch conical of 5.5 slightly convex whorls; see under SEM 1.5 spherical embryonic whorls thickly grained in lower part, subsequent whorls smooth showing a sub-sutural band of very minute grains. Colour whitish. Teleoconch of 8.5 whorls with spiral sculpture of 3 spiral cords (2<sup>nd</sup> narrower and less prominent), spiral interspaces crossed by fine close-set axial threads. A fourth cord at the base of last whorl emerging from insertion of outer lip. Shell juvenile with incomplete aperture. Background colour pale brown with white flashes on the whole surface.

**Comparison**

*Seila slacksmithae* n. sp. is compared for its conical shape to *Seila conica*, *S. decorata* and *S. wareni*, all Cecalupo & Perugia, 2012 from the Philippines; the main difference is the longer protoconch of 5.5 whorls vs 3.5 in *S. conica*, 2 in the others. For the colour reminds *S. maxima* Cecalupo & Perugia, 2014 this too with a shorter protoconch.

**Etymology**

*slacksmithae*, after Sheila Slack-Smith, formerly curator of molluscs at the Western Australian Museum and an erudite of the Western Australian marine mollusc fauna.

***Seila*** sp.  
(Fig. 16. I-K)

**Figured specimen**

I-K - (WAM) 3.96 x 1.38 mm, protoconch broken, stn WA13.

**Distribution**

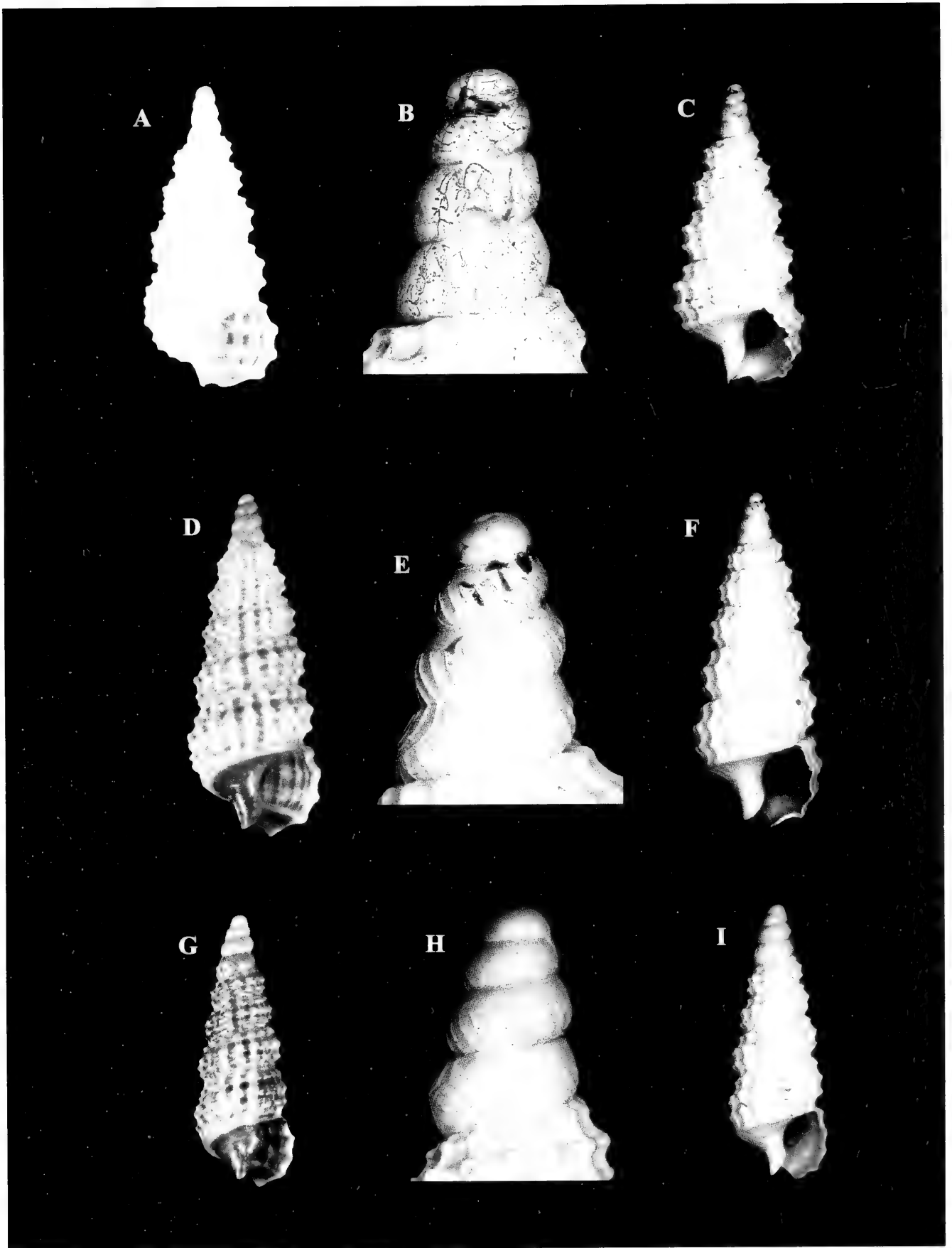
Western Australia.

**Material examined**

stn WA13, Albany, Mistaken Is., King George Sound, 10 m, spm 1.

**Description**

Shell medium, juvenile, bottle-shaped, sutures not discernible, base excavate. Protoconch conical of 3.5-4 convex whorls. See under SEM 1.5: apical whorl damaged but from the remaining fragment we can see a sculpture of axial ribs divided into small sections and forming spiral bands; subsequent whorls smooth showing sutures marked by very minute grains. Colour yellowish,



**Fig. 15. [Western Australia]. A-C.** *Clathropsis* sp., (WAM), 2,41 x 0,97 mm, protoconch 0,45 x 0,23 mm, Albany, South side Possession Point, King George Sound, stn WA11, **D-F.** *Marshallopsis hughmorrisoni* n. sp., holotype (WAM), 2,91 x 1,05 mm, protoconch 0,42 x 0,25 mm, stn Esperance, Rabbit Is., SW side, stn WE09, **G-I.** *Marshallopsis hughmorrisoni* n. sp., paratype 1 (WAM), 2,06 x 0,72 mm, protoconch 0,43 x 0,24 mm, Albany, SE corner, Hassel Beach, 0-1 m, stn WA25

**Fig. 15. [Western Australia]. A-C.** *Clathropsis* sp., (WAM), 2,41 x 0,97 mm, protoconca 0,45 x 0,23 mm, Albany, lato sud del Possession Point, King George Sound, stn WA11, **D-F.** *Marshallopsis hughmorrisoni* n. sp., olotipo (WAM), 2,91 x 1,05 mm, protoconca 0,42 x 0,25 mm, stn Esperance, Rabbit Is., lato a sud ovest, stn WE09, **G-I.** *Marshallopsis hughmorrisoni* n. sp., paratipo 1 (WAM), 2,06 x 0,72 mm, protoconca 0,43 x 0,24 mm, Albany, angolo a sud est, Hassel Beach, 0-1 m, stn WA25

## Figured specimens

J - (WAM) 3.43 x 1.17 mm, protoconch, 0.62 x 0.28 mm, stn WE09.

K-L - (WAM) 4.29 x 1.18 mm, protoconch 0.65 x 0.28 mm, stn WA11.

## Type locality

Australia NSW, 14 fathoms off Long Reef.

## Distribution

Known only from type locality.

## Material examined

stn WA11, Albany, south side Possession Point, King George Sound, 7 m, spms 3; stn WE09, Esperance, Rabbit Is., SW side, 12-25 m, spms 2.

## *Clathropsis* sp. (Fig. 15. A-C)

## Figured material

A-C - (WAM) 2.41 x 0.97 mm, protoconch 0.45 x 0.23 mm, stn WA11.

## Locality

Western Australia, Albany, south side Possession Point, King George Sound, 7 m.

## Distribution

Known only from Albany (W Australia).

## Material examined

stn WA11, Albany, south side Possession Point, King George Sound, 7 m, spms 5.

## Description

Shell small, juvenile, sutures wide, colour bright white, interspaces colourless, transparent, protoconch opaque white. Protoconch small, conical of about 4.5 smooth convex whorls, apex rounded. Teleoconch of 4 convex whorls with reticulate sculpture of 3 spiral cords (1<sup>st</sup> narrower and less prominent) crossed by weaker axial ribs, about 14 on last whorl; beads at each intersection. A 4<sup>th</sup> beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a angulation. Aperture incomplete.

## Remarks

Probably it is a new species. All specimens are juvenile, only one complete with protoconch.

## *Marshallopsis hughmorrisoni* n. sp. (Fig. 15. D-F, G-I)

## Type material

holotype - (WAM) 2.91 x 1.05 mm, protoconch 0.42 x 0.25 mm, stn WE09.

paratype 1 - (WAM) 2.06 x 0.72 mm, protoconch 0.43 x 0.24 mm, stn WA25.

## Type locality

Western Australia, Esperance, Rabbit Is., 12-25 m.

## Distribution

Known only from type locality

## Material examined

stn WA25, Albany, SE corner, Hassel Beach, 0-1 m, intertidal, spm 1; stn WE09, Esperance, Rabbit Is., SW side, 12-25 m, spm 1.

## Description of holotype

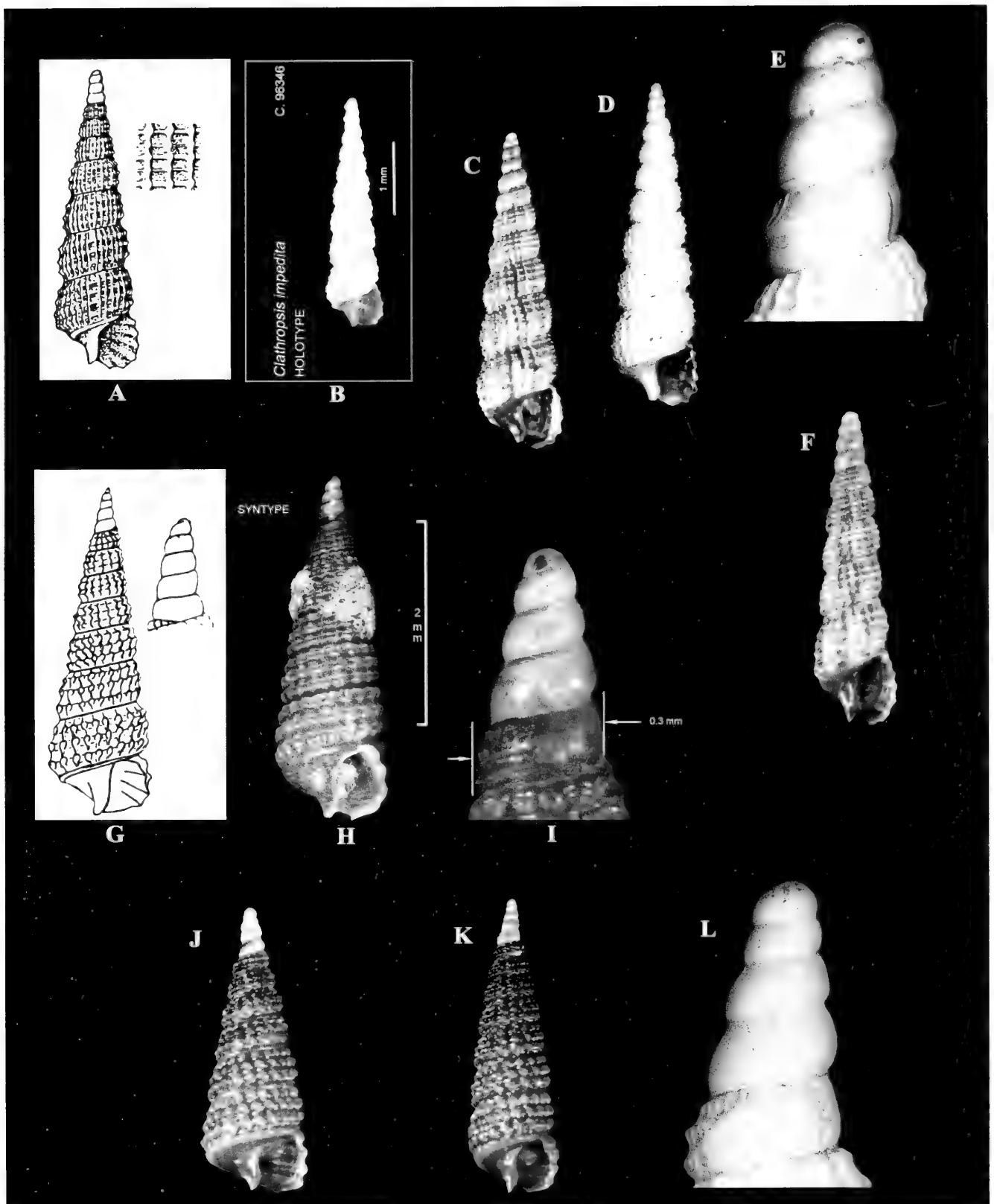
Shell small, conical with wide sutures. Protoconch conical of about 4.5 convex whorls; seen under SEM first 1.5 embryonic whorls smooth with a slight granulation in the lower part, subsequent whorl are smooth on the third upper part with a line of minute grain below the suture, on the lower show a sculpture of thin prosocline axial riblets (about 20 per whorl regularly spaced). Colour yellowish, semitransparent. Teleoconch of 5.5 whorls with reticulate sculpture of 3 spiral cords (2<sup>nd</sup> a little big) crossed by axial ribs, about 16 on last whorl; small beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a thin thread. Aperture incomplete. Colour yellowish, interspaces semitransparent, spiral cords orange but beads opaque white, columella red brown. The Paratype 1 is very more brownish.

## Comparison

*Marshallopsis hughmorrisoni* n. sp. can be compared with *Marshallopsis flavescens* and *M. kantori* both Cicalupo & Perugia, 2013 from Vanuatu; the first differs by having a longer protoconch (0.60 x 0.30 mm), a paler colour and a ratio W/H 0.31 vs 0.36, the second, with a large Indo-Pacific distribution, has a much more cylindrical shape and a colour orange brown with white flashes over the entire surface. *M. chirlii* Cicalupo & Perugia, 2014 from South Madagascar differs mainly from having much less impressed sutures.

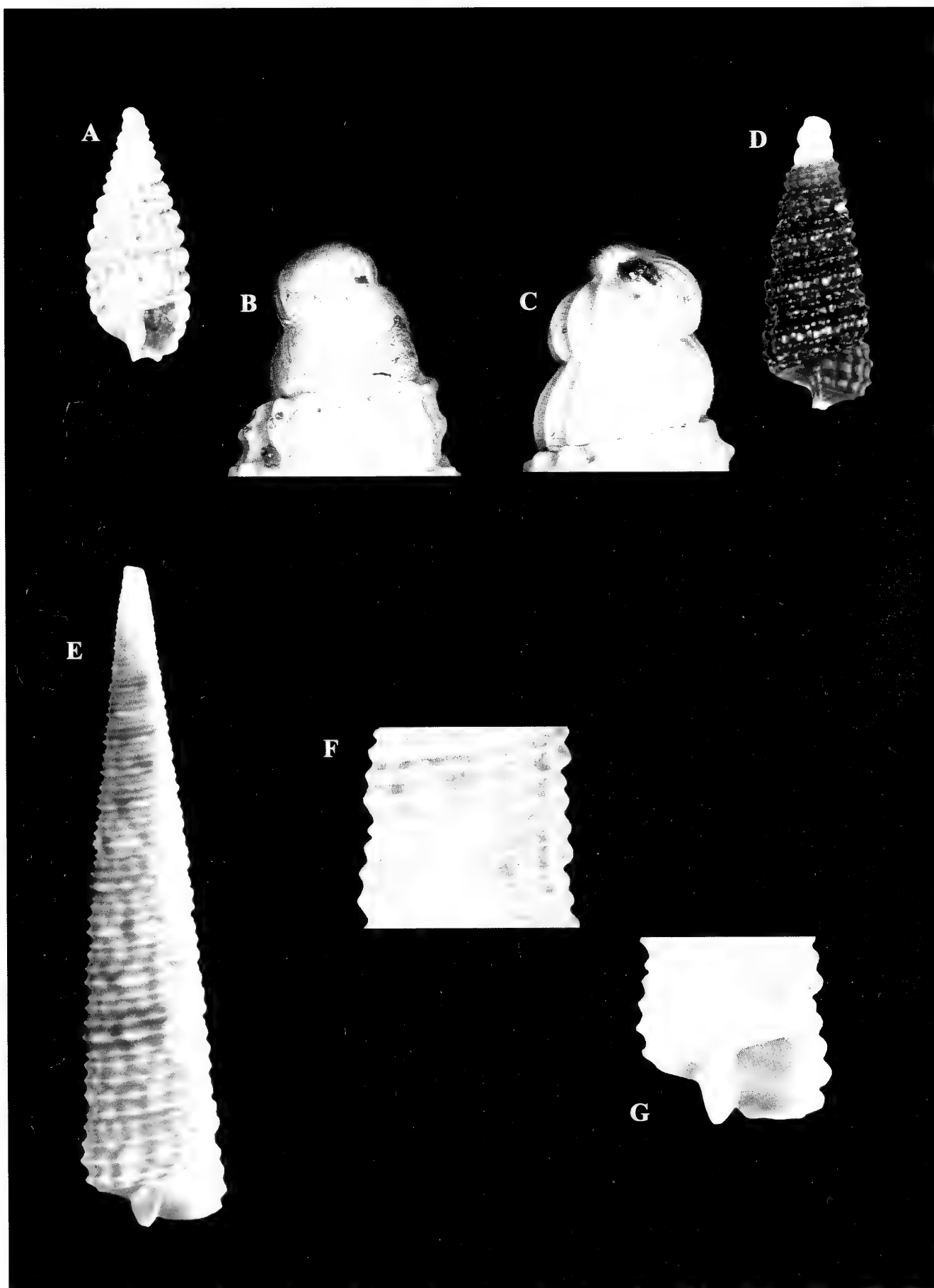
## Etymology

*hughmorrisoni*, after Hugh Morrison, of Perth (Western



**Fig. 14. [Western Australia]. A-B.** *Clathropsis impedita* Laseron, 1956, holotype, (AMS C.96346), Mastheard Is., Capricorn Group, Qld., East Australia; **C-E.** *Clathropsis impedita* Laseron, 1956 (WAM), 3.73 x 1.07 mm, protoconch 0.52 x 0.23 mm, Albany, Mistaken Is., King George Sound, stn WA13; **F.** *Clathropsis impedita* Laseron, 1956 (WAM), 2.58 x 0.75 mm, protoconch 0.50 x 0.23 mm, Albany, Mistaken Is., King George Sound, Stn WA13; **G.** *Clathropsis quinquepilia* Laseron, 1951, holotype, 4.00 mm, off Long Reef, Collaroy, NSW; **H-I.** *Clathropsis quinquepilia* Laseron, 1951 (AMS C.175241), syntype, off Long Reef, Collaroy, NSW; **J.** *Clathropsis quinquepilia* Laseron, 1951 (WAM), 3.43 x 1.17 mm, protoconch 0.62 x 0.28 mm, Esperance, Rabbit Is., SW side, stn WE09; **K-L.** *Clathropsis quinquepilia* (WAM), dim. 4.29 x 1.18 mm, protoconch dim. 0.65 x 0.28 mm, Albany, south side Possession Point, King George Sound, stn WA11.

**Fig. 14. [Western Australia]. A-B.** *Clathropsis impedita* Laseron, 1956, olotipo, (AMS C.96346), Mastheard Is., Capricorn Group, Qld., East Australia; **C-E.** *Clathropsis impedita* Laseron, 1956 (WAM), 3,73 x 1,07 mm, protoconca 0,52 x 0,23 mm, Albany, Mistaken Is., King George Sound, stn WA13; **F.** *Clathropsis impedita* Laseron, 1956 (WAM), 2,58 x 0,75 mm, protoconca 0,50 x 0,23 mm, Albany, Mistaken Is., King George Sound, Stn WA13; **G.** *Clathropsis quinquepilia* Laseron, 1951, olotipo, 4,00 mm, al largo del Long Reef, Collaroy, NSW; **H-I.** *Clathropsis quinquepilia* Laseron, 1951 (AMS C 175241), sintipo, al largo del Long Reef, Collaroy, NSW; **J.** *Clathropsis quinquepilia* Laseron, 1951 (WAM), 3,43 x 1,17 mm, protoconca 0,62 x 0,28 mm, Esperance, Rabbit Is., lato a sud ovest, stn WE09; **K-L.** *Clathropsis quinquepilia* (WAM), dim. 4,29 x 1,18 mm, protoconca dim 0,65 x 0,28 mm, Albany, lato sud del Possession Point, King George Sound, stn WA11.



**Fig. 13. [South Madagascar]. A-B.** *Horologica lavanonoensis* Cecalupo & Perugia, 2014 (MNHN-IM-2012-25526), 2,51 x 1,06 mm, protoconch 0,28 x 0,21 mm, Faux Cap, stn BM12; **C-D.** *Mendax metivieri* Jay & Drivas, 2002 (MNHN-IM-2012-25527), 2,73 x 1,10 mm, protoconch dim 0,50 x 0,37 mm, SW Cap Sainte, stn DW3605; **E-G.** *Seila maxima* Cecalupo & Perugia, 2014, 18,60 x 4,10 mm, Fort Dauphin, low tide [Perugia coll.]

**Fig. 13. [South Madagascar]. A-B.** *Horologica lavanonoensis* Cecalupo & Perugia, 2014 (MNHN-IM-2012-25526), 2,51 x 1,06 mm, protoconca 0,28 x 0,21 mm, Faux Cap, stn BM12; **C-D.** *Mendax metivieri* Jay & Drivas, 2002 (MNHN-IM-2012-25527), 2,73 x 1,10 mm, protoconca dim 0,50 x 0,37 mm, SW Cap Sainte, stn DW3605; **E-G.** *Seila maxima* Cecalupo & Perugia, 2014, 18,60 x 4,10 mm, Fort Dauphin, bassa marea [Perugia coll.]

Distribution

New Caledonia, New Zealand, North Australia, South Africa.

Material examined

South Africa, 165 m, 35°40'S-21°59'E, spm 1, Expedition VEMA.

Remarks

First report from South Africa.

INDIAN OCEAN MATERIAL:  
SOUTH MADAGASCAR

*Horologica lavanonoensis*  
Cecalupo & Perugia, 2014  
(Fig. 13. A, B)

Figured specimen

A-B - (MNHN-IM-2012-25526) 2.51 x 1.06 mm, protoconch 0.28 x 0.21 mm, stn BM12.

Type locality

South Madagascar, Lavanono Beach.

Distribution

Known only from type locality.

Material examined

stn BM12, Faux Cap, spm 1.

*Mendax metivieri* Jay & Drivas, 2002  
(Fig. 13. C, D)

*Mendax metivieri* Jay & Drivas, 2002: 3, pl. II, fig. 49; pl. 8, fig. B.

Figured specimen

C-D - (MNHN-IM-2012-25527) 2.73 x 1.10 mm, protoconch 0.50 x 0.37 mm, stn DW3605.

Type locality

La Reunion, Saint-Gilles-les-Bains, between harbour and Boucan-Canot.

Distribution

Comoro Is., La Reunion, South Madagascar.

Material examined

stn DW3605, SW Cap Sainte Marie, 56-57 m, spm 1.

Remarks

First report from South Madagascar.

*Seila maxima* Cecalupo & Perugia, 2014  
(Fig. 13. E-G)

Figured specimen

E-G - 18.60 x 4.10 mm, protoconch missing, Fort Dauphin (Perugia Coll.).

Type locality

South Madagascar, Albatros Rock, 11-12 m.

Distribution

South Madagascar, New Caledonia.

Material examined

Fort Dauphin, spm 1, low tide.

Remarks

Note the considerable size.

INDIAN OCEAN MATERIAL:  
WESTERN AUSTRALIA

*Clathropsis impedita* Laseyron, 1956  
(Fig. 14 A-C, E, F)

*Clathropsis impedita* Laseyron, 1956: 159, figs. 9, 10.

Figured Specimens

C-E - (WAM) 3.73 x 1.07 mm, protoconch 0.52 x 0.23 mm, stn WA13.

F - (WAM) 2.58 x 0.75 mm, protoconch 0.50 x 0.23 mm, stn WA13.

Type locality

Western Australia, Qld, Capricorn Group, Masthead Is.

Distribution

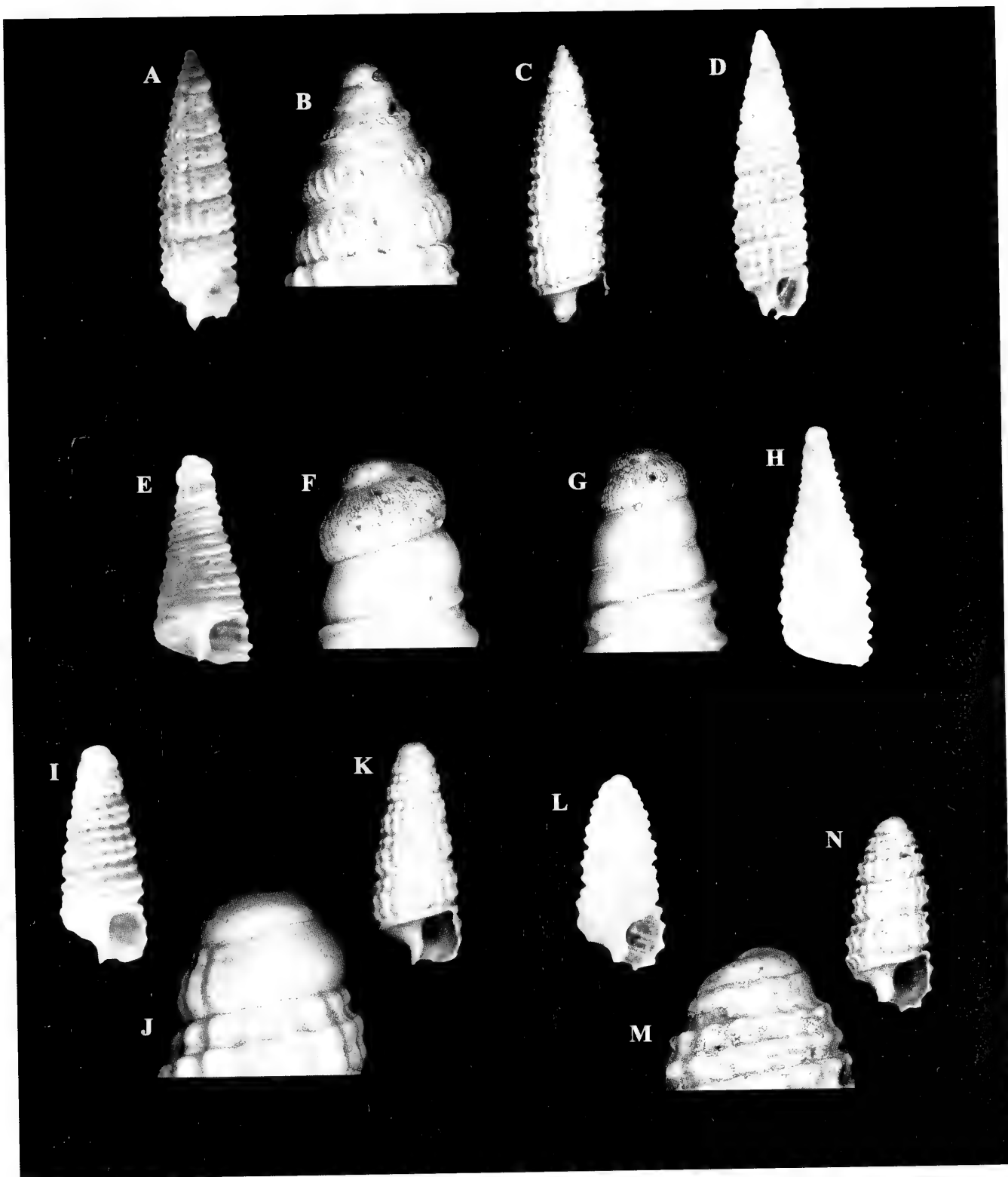
N & W Australia.

Material examined

stn WA13, Albany, Mistaken Is., King George Sound, 10 m, spms 2.

*Clathropsis quinquepilia* (Laseyron, 1951)  
(Fig. 14. G-I, J-L)

*Cerithiopsis quinquepilia* Laseyron, 1951: 357, figs 10, 10a, pl. 35.



**Fig. 12. [South Africa; Comoro Is.; New Caledonia].** A-C, D. *Marshallopsis gombessa* n. sp., holotype (MNHN-IM-2000-36033), 2.45 x 0.70 mm, protoconch 0.52 x 0.32 mm, Sodwana Bay, North side, Jesser Canyon, right of cavity "Ucave" (Ballesta & Clément coll.), stn 2; D. *Marshallopsis gombessa* n. sp., paratype 1 (MNHN-IM-2000-36034), 2.20 x 0.77 mm, protoconch 0.52 x 0.28 mm, Comoro Is., a sud di Mayotte, stn DW4820; E-F. *Seila* cfr. *ampulla* (Laseron, 1956) (MNHN-IM-2012-25523), 2.51 x 1.07 mm, protoconch 0.60 x 0.43 mm, Sodwana Bay, North side, Jesser Canyon, right of cavity "Ucave" (L. Ballesta & G. Clément coll.), stn 2; G-H. *Seila silviae* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25524), 2.88 x 1.02 mm, protoconch 0.52 x 0.33 mm, Sodwana Bay, North side, Jesser Canyon, right of cavity "Ucave" (L. Ballesta & G. Clément coll.), stn 2; I-K. *Specula styliiformis* (Suter, 1908) (MNHN-IM-2012-25525), 2.04 x 0.79 mm, protoconch 0.48 x 0.46 mm, South Africa, 165 m; L-N. *Specula styliiformis* (Suter, 1908), 1.18 x 0.51 mm, protoconch 0.15 x 0.24 mm, New Caledonia, Norfolk Ridge, P Bank, stn DW1724.

**Fig. 12. [South Africa; Comoro Is.; New Caledonia].** A-C, D. *Marshallopsis gombessa* n. sp., olotipo (MNHN-IM-2000-36033), 2,45 x 0,70 mm, protoconca 0,52 x 0,32 mm, Sodwana Bay, lato nord, Jesser Canyon, a destra della cavità "Ucave" (Ballesta & Clément coll.), stn 2; D. *Marshallopsis gombessa* n. sp., paratipo 1 (MNHN-IM-2000-36034), 2,20 x 0,77 mm, protoconca 0,52 x 0,28 mm, Comoro Is., a sud di Mayotte, stn DW4820; E-F. *Seila* cfr. *ampulla* (Laseron, 1956) (MNHN-IM-2012-25523), 2,51 x 1,07 mm, protoconca 0,60 x 0,43 mm, Sodwana Bay, lato nord, Jesser Canyon, a destra della cavità "Ucave" (L. Ballesta & G. Clément coll.), stn 2; G-H. *Seila silviae* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25524), 2,88 x 1,02 mm, protoconca 0,52 x 0,33 mm, Sodwana Bay, lato nord, Jesser Canyon, a destra della cavità "Ucave" (L. Ballesta & G. Clément coll.); I-K. *Specula styliiformis* (Suter, 1908) (MNHN-IM-2012-25525), 2,04 x 0,79 mm, protoconca 0,48 x 0,46 mm, South Africa, 165 m; L-N. *Specula styliiformis* (Suter, 1908), 1,18 x 0,51 mm, protoconca 0,15 x 0,24 mm, New Caledonia, Norfolk Ridge, P Bank, stn DW1724



with flat sides of 4.5 whorls; seen under SEM first 1.5 embryonic whorls granulous, subsequent whorls are smooth on the upper part with a band of minute grains under the sutures, on the lower show a sculpture of axial riblets (about 26 for whorl regularly spaced), with thin very close-set opisthocline irregular threads in interspaces. Teleoconch of 6.5 whorls with reticulate sculpture of 3 spiral cords crossed by axial ribs, about 16 on last whorl (spiral cords and axial ribs near equal in size); beads at each intersection. A fourth beaded cord at the base of last whorl emerging from insertion of outer lip, aperture damaged. In paratype limit between columella and base highlighted by angulation; columella short and broad, obliquely truncated, columellar callus bordering an oval aperture, anal sulcus and siphonal canal well defined.

### Comparison

*Marshallopsis gombessa* n. sp. by shape and colour can be easily confused with *Synthopsis praeacuta* Cecalupo & Perugia, 2012 with a wide Indo-Pacific range, main difference is the sculpture of the protoconch. *Marshallopsis kantori* Cecalupo & Perugia, 2013 from New Caledonia & Vanuatu differs in the narrowly conical shape, the most impressed sutures, the not uniform colour and the sculpture of the lower part of the protoconch occupies 2/3 of the whorl vs 1/2 in *Marshallopsis gombessa* n. sp.

### Etymology

*gombessa*, after the Gombessa Coalacanth expedition, during which it was collected by Laurent Ballesta, trimix diver and explorer of the mesophotic zone.

*Seila* cfr. *ampulla* (Laseron, 1956)  
(Fig. 12. E, F)

### Figured specimen

E-F - (MNHN-IM-2012-25523) 2.51 × 1.07 mm, protoconch 0.60 × 0.43 mm, Sodwana Bay, 110 m.

### Type locality

Solanderian and Dampierian Provinces in northern Australia.

### Distribution

North Australia, Philippines, South Africa.

### Material examined

stn 2, Sodwana Bay, N side, Jesser Canyon, right of cavity "Ucave", spm 1 (L. Ballesta & G. Clément coll.).

### Remarks

First report from South Africa.

*Seila silviae* Cecalupo & Perugia, 2012  
(Fig. 12. G, H)

### Figured specimen

G-H - (MNHN-IM-2012-25524) 2.88 × 1.02 mm, protoconch 0.52 × 0.33 mm, Sodwana Bay, 110 m.

### Type locality

Philippines, between Panglao Is. and Balicasag Is.

### Distribution

Indopacific range.

### Material examined

stn. 2, South Africa, Sodwana Bay, N side, Jesser Canyon, right of cavity "Ucave", spm 1, (L. Ballesta & G. Clément coll.).

### Remarks

First report from South Africa.

*Specula styliiformis* (Suter, 1908)  
(Fig. 12. I-K, L-N)

*Cerithiopsis styliiformis* Suter, 1908: 36, pl. 3, fig. 43 [Published, 1913: 248]; 1909: 20; 1913: 248, pl. 14, fig. 22; 1915: pl. 14, fig. 22 (Southern Australia); Thiele, 1929: 216; Cotton, 1951: 383; Fleming, 1966: 48; Nützel, 1998: 47; Wilson, 1993: 259.

*Cerithiopsis (Specula) styliiformis* in Wenz, 1938-1944: 776, fig. 2246.

*Seila dissimilis* Odhner, 1924: 28, pl. 1, fig. 18; Suter, 1909: 20; Suter, 1913: 253, pl. 14, fig. 28; 1915: pl. 14, fig. 28; Finlay, 1926: 385; Powell, 1955: 91; 1976: 93; Marshall B.A., 1978: 76, 77; Powell, 1979: 133; Jay & Drivas, 2002: 39; Spencer et al. (species list): 2004.

*Specula dissimilis* Suter <sup>1</sup>, 1908: 37, pl. 3, fig. 47; Suter <sup>2</sup>, 1908: 253, pl. 14, fig. 29; Kershaw, 1955: 311; Powell, 1955: 91; Spencer et al. (species list): 2004.

*Specula styliiformis* (Suter, 1908): 253, pl. 14, fig. 29; Cecalupo & Perugia, 2017: 87, pl. 45, figs 4 a-c.

*Zaclys styliiformis* Cotton, 1951: 383, 385.

### Figured specimens

I-K - (MNHN-IM-2012-25525) 2.04 × 0.79 mm, protoconch 0.48 × 0.46 mm, 165 m South Africa.

L-N - 1.18 × 0.51 mm, protoconch 0.15 × 0.24 mm, Norfolk Ridge, P Bank New Caledonia, stn. DW1724.

### Type locality

Three Kings Islands to Campbell Islands 15-805 m (Powell, 1955: 91).

Remarks

First report for Mozambique.

*Synthopsis noninii* Cecalupo & Perugia, 2012  
(not figured)

Type locality

Philippines, Panglao Is., near Napaling.

Distribution

Indopacific area.

Material examined

stn MB1, Inhaca Is., Ponta Torres, 5-8 m, spms 2; stn MS1, Inhaca Is., Ponta Abril, 14 m, spm 1; stn MS3, Inhaca Is., Ponta Torres, 8-10 m, spm 1; stn MS10, Inhaca Is., vers le Banc China, 14 m, spm 1; stn MS11, Inhaca Is., Barreira Vermelha, 6 m, spm 1.

Remarks

First report for Mozambique.

*Synthopsis praeacuta*  
Cecalupo & Perugia, 2012  
(not figured)

Type locality

Philippines, Panglao Is., BBC Point.

Distribution

Indopacific area.

Material examined

stn MD26, Ile d’Inhaca: devant Ponta Malengane, 75 m, sable, spm 1, Expedition INHACA 2011.

Remarks

First report for Mozambique.

*Tubercliopsis miranda*  
Cecalupo & Perugia, 2012  
(not figured)

Type locality

Philippines, Pamicalan Is.

Distribution

Indopacific area.

Material examined

stn MM2, Ile d’Inhaca: Ponta Punduine, marée, spms 2; stn MM4, ile d’Inhaca: Ponta Punduine, marée, spms 2; stn MS11, Ile d’Inhaca: Barreira Vermelha, 6 m, spms 2, Expedition INHACA 2011.

Remarks

First report for Mozambique.

INDIAN OCEAN MATERIAL: SOUTH AFRICA

*Marshallopsis gombessa* n. sp.  
(Fig. 12. A-C, D)

Type material

**holotype** - (KZN, Kwa-Zulu Natal, Museum, Pietermaritzburg) 2.45 x 0.70 mm, protoconch 0.52 x 0.32 mm, South Africa, Sodwana Bay, stn 2.

**paratype 1** - (MNHN-IM-2000-36034) 2.20 x 0.77 mm, protoconch 0.52 x 0.28 mm, 125 m, Comoro Is., South Mayotte, stn DW4820.

**paratype 2** - (MNHN-IM-2000-36035) 2.87 x 0.72 mm, protoconch 0.50 x 0.30 mm, Mozambique, Inhaca Is., stn MD26.

**paratype 3** - (MNHN-IM-2000-36036) 2.30 x 0.70 mm, protoconch 0.50 x 0.32 mm, Comoro Is., S Mayotte, stn DW4864.

**paratype 4** - (MNHN-IM-2000-36037) 2.12 x 0.70 mm, protoconch 0.55 x 0.32 mm, Comoro Is., NW Mayotte, stn DW4860.

Type locality

South Africa, Sodwana Bay, 110 m.

Distribution

Comoro Is., Mozambique, South Africa.

Material examined

Comoro Is.: stn DW4820, South Mayotte, spms 2, 295-336 m; stn DW4826, S Mayotte, spm 1, 489-496 m; stn DW4860, NW Mayotte, spm 1, 486-646 m; stn DW4865, S Mayotte, spm 1, 489-496 m, Expedition BIOMAGLO. Mozambique: stn MD26, Inhaca Is., in front to Ponta Malengane, spm 1, 75 m.

South Africa: stn 2, Sodwana Bay, N side, Jesser Canyon, right of cavity “Ucave”, spm 1, 125 m, (Ballesta & Clément coll.).

Description of holotype

Shell small, conical slightly inflated with moderately impressed sutures; in not perfect condition with outer lip damaged. Colour teleoconch uniformly pale sandy yellow, protoconch slightly darker. Protoconch conical

### Type locality

Philippines, Bohol Is., Manga.

### Distribution

Indopacific area.

### Material examined

stn MB5, Inhaca Is., SW Ilha dos Portugueses, 2-10 m, spm 1, Expedition INHACA 2011.

### Remarks

First report for Mozambique.

*Joculator mygaki* Jay & Drivas, 2002  
(Fig. 11. H)

### Figured specimen

H - (MNHN-IM-2012-25521) 2.32 x 0.90 mm, protoconch 0.55 x 0.32 mm, stn MB5.

### Type locality

Reunion, Saint-Gilles-les-Bains, off Boucan-Canot beach.

### Distribution

Mozambique, Reunion, South Madagascar.

### Material examined

stn MB5, Inhaca Is., Vermelha Barrier, 6 m, spm 1, EXPEDITION INHACA 2011.

### Remarks

First report for Mozambique.

*Marshallopsis joserosadoi* n. sp.  
(Fig. 11. I-K)

### Type material

holotype - (MNHN-IM-2000-36032) 2.11 x 0.75 mm, protoconch 0.50 x 0.27 mm, stn MB6.

### Type locality

Mozambique, Inhaca Is., SW Dos Portugueses Is.

### Distribution

Known only from type locality.

### Material examined

stn MB6, Inhaca Is., Ilha dos Portugueses, 2-10 m, spm 1.

### Description of holotype

Shell small, conical with moderately impressed sutures. Protoconch conical 4.5 convex whorls; seen under SEM first 1.5 embryonic whorls smooth, subsequent whorl are smooth on the half upper part, on the lower show a sculpture of thin prosocline axial riblets (about 16 per whorl regularly spaced) and a very fine crisp thread immediately above the suture. Colour brownish, semi-transparent. Teleoconch of 5 whorls with reticulate sculpture of 3 equal spiral cords crossed by weaker axial ribs, about 18 on last whorl; beads at each intersection. A fourth beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a groove. Columella short and broad, obliquely truncated, with surface crossed by crisp threads, columellar callus bordering an oval aperture; anal sulcus and siphonal canal well defined. Colour light brown.

### Comparison

*Marshallopsis joserosadoi* n. sp. is easily distinguishable from other species of the genus for its particular shape and colour; these characteristics we find in *Joculator humilis* Cecalupo & Perugia, 2012 from Philippines, *J. jeffkinchi* and *J. minimului* both Cecalupo & Perugia, 2018 from Papua New Guinea, whose protoconchs are smooth without prosocline axial sculpture.

### Etymology

*joserosadoi*, after Jose Rosado, of Maputo, explorer and discoverer of the Mozambique mollusc fauna and the organizer of the INHACA 2011 expedition.

*Synthopsis albachiarae*  
Cecalupo & Perugia, 2012  
(Fig. 11. L)

### Figured specimen

L - (MNHN-IM-2012-25522) 3.47 x 1.00 mm, protoconch 0.53 x 0.25 mm, stn MB5.

### Type locality

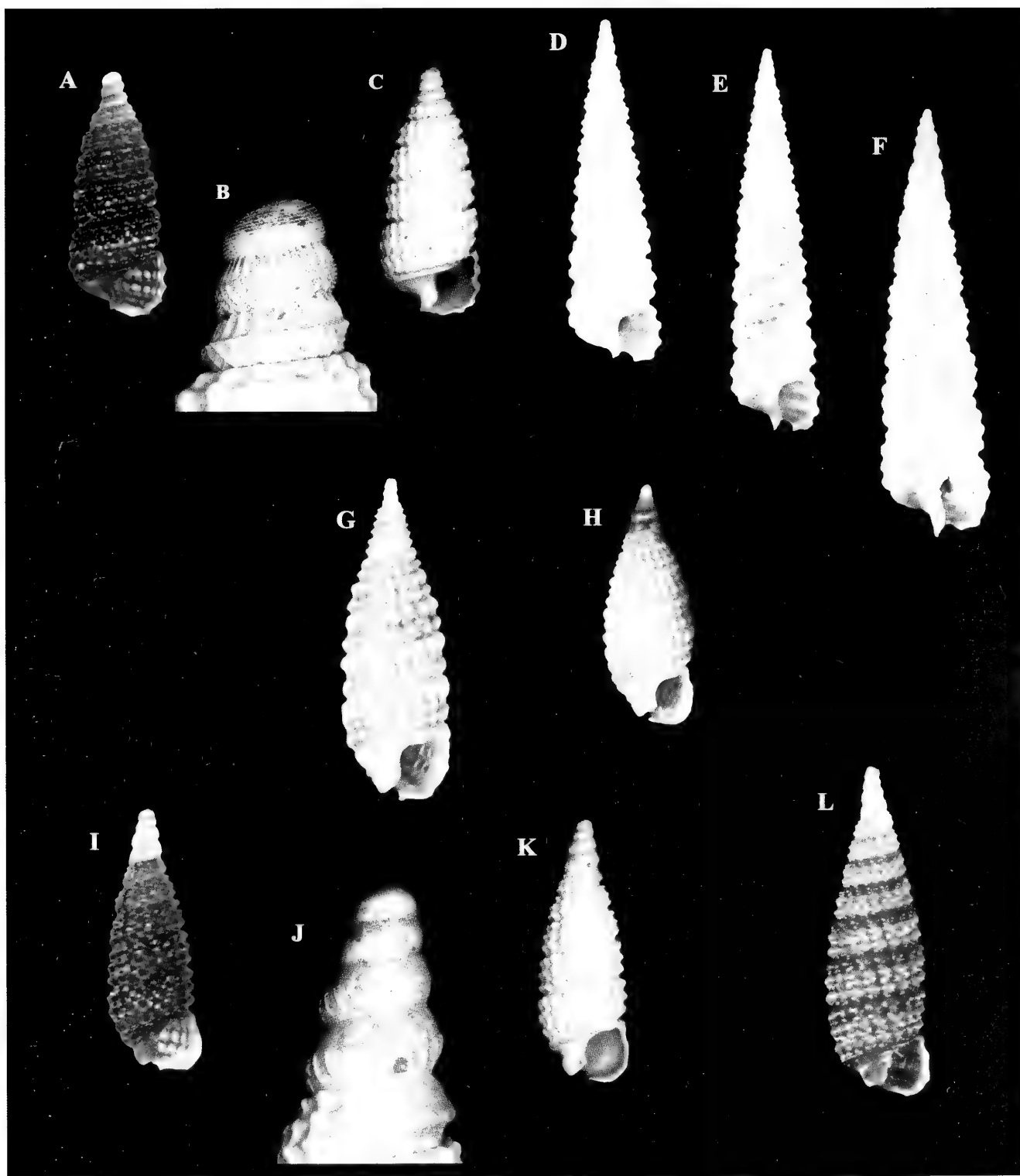
Philippines, Panglao Is, Bingag/Tabalong.

### Distribution

Indonesia, Papua New Guinea, Philippines, South Madagascar, Mozambique.

### Material examined

stn MB5, Inhaca Is., Vermelha Barrier, 6 m, spm 1; stn MM2, Inhaca Is., Ponta Pundine, marée, spm 1; stn MS11, Inhaca Is., Barreira Vermelha, 6 m, spms 2.



**Fig. 11. [Mozambique].** A-C. *Cerithiopsidella caterinae* Cecalupo & Perugia, 2014 (MNHN-IM-2012-25516), 2.30 x 0.90 mm, protoconch 0.37 x 0.24 mm, Ihaca Is., SW Ilha dos Portugueses, stn MB6; D. *Clathropsis* cf. *arcangelae* Cecalupo & Perugia, 2017 (MNHN-IM-2012-25517), 4.44 x 1.30 mm, Inhaca Is., Vermelha Barrier, stn MS11; E. *Clathropsis bugeae* Cecalupo & Perugia, 2014 (MNHN-IM-2012-25518), 5.89 x 1.45 mm, Inhaca Is., stn MS6; F. *Clathropsis charlesi* Cecalupo & Perugia, 2014 (MNHN-IM-2012-25519), 5.87 x 1.53 mm, protoconch 0.72 x 0.33 mm, Inhaca Is., Ponta Abril, stn MS1 & MS2; G. *Horologica gwenaellae* Cecalupo & Perugia, 2013 (MNHN-IM-2012-25520), 4.66 x 1.54 mm, Inhaca Is., SW Ilha dos Portugueses, stn MB6; H. *Joculator mygaki* Jay & Drivas, 2002 (MNHN-IM-2012-25521), 2.32 x 0.90 mm, protoconch 0.55 x 0.32 mm, Inhaca Is., SW Dos Portugueses Is., stn MB5; I-K. *Marshallopsis joserosadoi* n. sp. holotype (MNHN-IM-2000-36032) 2.11 x 0.75 mm, protoconch 0.50 x 0.27 mm, Inhaca Is., SW Dos Portugueses Is., stn MB6; L. *Synthopsis albachiarae* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25522), 3.47 x 1.00 mm, protoconch 0.53 x 0.25 mm, Inhaca Is., Vermelha Barrier, stn MB5.

**Fig. 11. [Mozambique].** A-C. *Cerithiopsidella caterinae* Cecalupo & Perugia, 2014 (MNHN-IM-2012-25516), 2,30 x 0,90 mm, protoconcha 0,37 x 0,24 mm, Ihaca Is., a sud ovest di Ilha dos Portugueses, stn MB6; D. *Clathropsis* cf. *arcangelae* Cecalupo & Perugia, 2017 (MNHN-IM-2012-25517), 4,44 x 1,30 mm, Inhaca Is., Vermelha Barrier, stn MS11; E. *Clathropsis bugeae* Cecalupo & Perugia, 2014 (MNHN-IM-2012-25518), 5,89 x 1,45 mm, Inhaca Is., stn MS6; F. *Clathropsis charlesi* Cecalupo & Perugia, 2014 (MNHN-IM-2012-25519), 5,87 x 1,53 mm, protoconcha 0,72 x 0,33 mm, Inhaca Is., Ponta Abril, stn MS1 & MS2; G. *Horologica gwenaellae* Cecalupo & Perugia, 2013 (MNHN-IM-2012-25520), 4,66 x 1,54 mm, Inhaca Is., SW Ilha dos Portugueses, stn MB6; H. *Joculator mygaki* Jay & Drivas, 2002 (MNHN-IM-2012-25521), 2,32 x 0,90 mm, protoconcha 0,55 x 0,32 mm, Inhaca Is., a sud ovest di Dos Portugueses Is., stn MB5; I-K. *Marshallopsis joserosadoi* n. sp. olotipo (MNHN-IM-2000-36032) 2,11 x 0,75 mm, protoconcha 0,50 x 0,27 mm, Inhaca Is., a sud ovest di Dos Portugueses Is., stn MB6; L. *Synthopsis albachiarae* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25522), 3,47 x 1,00 mm, protoconcha 0,53 x 0,25 mm, Inhaca Is., Vermelha Barrier, stn MB5.

*Clathropsis* cfr. *arcangelae*

Cecalupo & Perugia, 2017  
(Fig. 11. D)

Figured specimen

D - (MNHN-IM-2012-25517) 4.44 x 1.30 mm, stn MS11.

Material examined

stn MS11, Inhaca Is., Vermelha Barrier, 6 m.

Remarks

The breaking of the protoconch before the SEM photos prevents us from being able to accurately confirm the identity of the species. *Clathropsis arcangelae* Cecalupo & Perugia, 2017 has been reported from New Caledonia, type locality Touho; it would be the first report for Mozambique and for the WE African coast.

*Clathropsis bugeae* Cecalupo & Perugia, 2014  
(Fig. 11. E)

Figured specimen

E - (MNHN-IM-2012-25518) 5.89 x 1.45 mm, stn MS6.

Type locality

South Madagascar, Antisirabe Cape.

Distribution

South Madagascar, Mozambique.

Material examined

stn MS6, Inhaca Is., in front of the Pass, 17-28 m, spm 1.

Remarks

First report for Mozambique.

*Clathropsis charlesi*  
Cecalupo & Perugia, 2014  
(Fig. 11. F)

Figured specimen

F - (MNHN-IM-2012-25519) 5.87 x 1.53 mm, protoconch 0.72 x 0.33 mm, stn MS1 & MS2.

Type locality

South Madagascar, point est of Galions Bay.

Distribution

South Madagascar, Mozambique.

Material examined

stn MS1 & MS2, Inhaca Is., Ponta Abril, 14-17 m, spms 2, EXPEDITION INHACA 2011.

Remarks

First report for Mozambique.

*Clathropsis multispirae*  
Cecalupo & Perugia, 2012  
(not figured)

Type locality

Philippines, Panglao Is, Bingag/Tabalong.

Distribution

Indopacific area.

Material examined

stn MB5, Inhaca Is., Vermelha Barrier, 6 m, spms 2; stn MB6, Inhaca Is., SW Ilha dos Portugueses, 2-10 m, spms 3; stn MB7, Inhaca Is., devant le village, 2-10 m, spm 1; stn MS11, Inhaca Is., Vermelha Barrier, 6 m, spms 2.

Remarks

First report for Mozambique.

*Horologica gwenaellae*  
Cecalupo & Perugia, 2013  
(Fig. 11. G)

Figured specimen

G - (MNHN-IM-2012-25520) 4.66 x 1.54 mm, stn MB6.

Type locality

Vanuatu, Espiritu Santo Is., S Turtle Is., 7 m.

Distribution

Japan, South Madagascar, Vanuatu, Mozambique.

Material examined

stn MB6, Inhaca Is., SW Ilha dos Portugueses, 2-10 m, spm 1.

Remarks

First report for Mozambique.

*Horologica nodosa* Cecalupo & Perugia, 2012  
(not figured)

cord at the base of last whorl emerging from insertion of outer lip; border between columella and base highlighted by weak cord. Columella short, columellar callus bordering a circular aperture with siphonal canal and anal sulcus defined.

Comparison

*Specula giustii* n. sp. is compared with: *Specula* cfr. *seragakiensis* Cecalupo & Perugia, 2019 from Okinawa similar in shape but different in colour and with more axial ribs; *Specula moalboalensis* Cecalupo & Perugia, 2012 from Cebu (Philippines), different in colour being glossy white, with sutures less impressed and protoconch with a granulous apex. It is also compared with *Specula queenslandica* Laseron, 1956 from Hope Is. (North Australia), which differs mainly in its sub-cylindrical shape and the more flat sides.

Etymology

*giustii*, after Francesco L. Giusti of Livorno (Italy), member of the Società Italiana di Malacologia (SIM).

*Synthopsis noninii* Cecalupo & Perugia, 2012  
not figured

Type locality

Panglao Is. Philippines.

Distribution

Philippines, Panglao Is. near Napaling, up to 30 m.

Material examined

stn DW62, Viti Levu, W Lagoon, 32 m, spm 1, Expedition Suva 2.

Remarks

First report from Fiji.

*Synthopsis praeacuta*  
Cecalupo & Perugia, 2012  
not figured

Type locality

Philippines, Panglao Is., BBC Point, 20-24 m.

Distribution

Indo-Pacific range.

Material examined

stn DW4800, Glorieuses Is., spm 1, 240-255 m, Expedition BIOMAGLO.

Remarks

1st report from Comoro Is.

*Tubercliopsis miranda*  
Cecalupo & Perugia, 2012  
(Fig. 10. G-I)

Figured specimen

G-I - 4.23 x 1.00 mm, protoconca 0.64 x 0.27 mm stn 4789.

Type locality

Philippines, Pamicaln Is., 26 m.

Distribution

Indo-Pacific range.

Material examined

stn DW4789, Geyser Bank, spm 1, 340-342 m; stn DW4807, Glorieuses Is., spm 1, 97-124 m; stn DW4820, South Mayotte, spms 2, 295-336 m, Expedition BIO-MAGLO.

Remarks

1st report from Comoro Is.

INDIAN OCEAN MATERIAL: MOZAMBIQUE

*Cerithiopsidella caterinae*  
Cecalupo & Perugia, 2014  
(Fig. 11. A-C)

Figured specimen

A-C - (MNHN-IM-2012-25516) 2.30 x 0.90 mm, protoconch 0.37 x 0.24 mm, stn MB6.

Type locality

South Madagascar, Lavanono area, 14-18 m.

Distribution

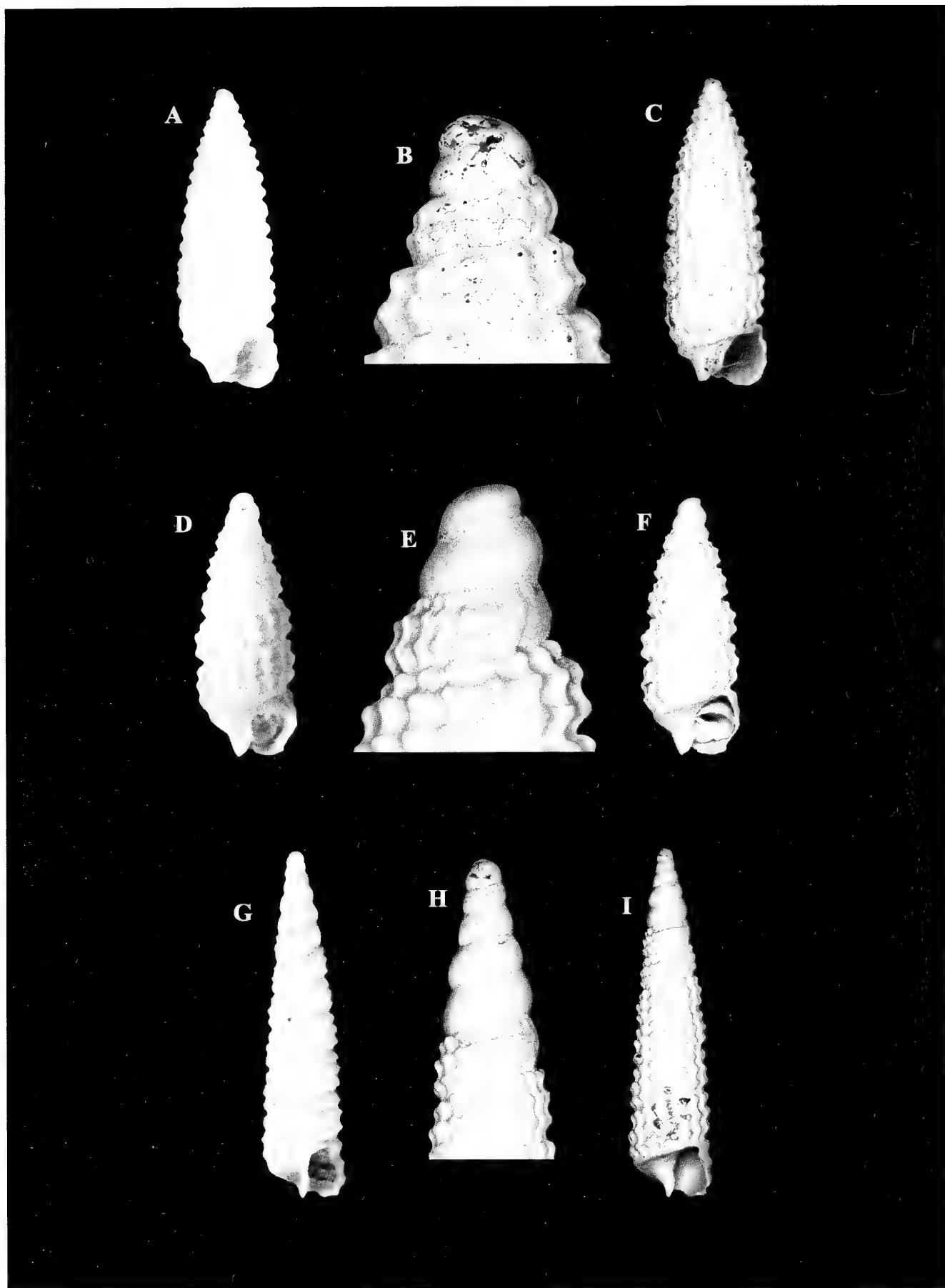
South Madagascar, Mozambique.

Material examined

stn MB6, inhaca Is., SW Ilha dos Portugueses, 2-10 m, spm 1, Expedition INHACA 2011.

Remarks

1st report for Mozambique.



**Fig. 10. [Comoro Is.]. A-C.** *Specula bogii* n. sp., holotype (MNHN-IM-2000-36028), 3.16 x 1.03 mm, protoconch 0.22 x 0.22 mm, south Mayotte, stn DW4820, **D-F.** *Specula giustii* n. sp. holotype (MNHN-IM-2000-36029), 2.12 x 0.77 mm, protoconch 0.37 x 0.30 mm, South Mayotte, stn DW4820, **G-I.** *Tuberclipsis miranda* Cecalupo & Perugia, 2012, 4.23 x 1.00 mm, protoconch 0.64 x 0.27 mm, Geyser Bank, stn DW4789

**Fig. 10. [Comoro Is.]. A-C.** *Specula bogii* n. sp., olotipo (MNHN-IM-2000-36028), 3,16 x 1,03 mm, protoconca 0,22 x 0,22 mm, a sud di Mayotte, stn DW4820, **D-F.** *Specula giustii* n. sp. olotipo (MNHN-IM-2000-36029), 2,12 x 0,77 mm, protoconca 0,37 x 0,30 mm, a sud di Mayotte, stn DW4820, **G-I.** *Tuberclipsis miranda* Cecalupo & Perugia, 2012, 4,23 x 1,00 mm, protoconca 0,64 x 0,27 mm, Geyser Bank, stn DW4789



## Material examined

stn DW4812, Glorieuses Is., spm 1, 390-417 m, Expedition BIOMAGLO.

## Description of holotype

Shell medium in size, conical with flat sides, sutures not discernible, colour yellowish but discoloured, original colour probably orange. Protoconch conical of 2.5 convex whorls; see under SEM 1.5 embryonic whorls show a granulous sculpture arranged in axial riblets, subsequent whorls smooth showing a sub-sutural band of very minute grains. Teleoconch of 6.5 whorls with spiral sculpture of 3 spiral cords (2<sup>nd</sup> narrower and less prominent); under SEM spiral interspaces crossed by fine close-set axial threads. A fourth cord at the base of last whorl emerging from insertion of outer lip, border between columella and base highlighted by an angle. Columella short, callus bordering a circular aperture, siphonal canal and anal sulcus defined.

## Comparison

*Seila gloriosa* n. sp. has the protoconch similar to *Seila wareni* Cecalupo & Perugia, 2012 from Philippines, species different being wider with exavate base and having a colour opaque with yellowish spots and *Seila ampulla* (Laseron 1956) from North Australia and Philippines clearly different being bottle shaped.

## Etymology

*gloriosa*, from Glorieuses Is., type locality.

***Specula bogii* n. sp.**  
(Fig. 10. A-C)

## Type material

holotype - (MNHN-IM-2000-36028) 3.16 x 1.03 mm, protoconch 0.22 x 0.22 mm, stn DW4820.

## Type locality

Comoro Is., South Mayotte, 295-336 m.

## Distribution

Known only from type locality.

## Material examined

stn DW4820, South Mayotte, spm 1, 295-336 m, Expedition BIOMAGLO.

## Description of holotype

Shell whitish opaque probably discoloured, medium in size, conical slightly inflated, sutures moderately im-

pressed but distinct. Protoconch small of 2 smooth convex whorls. Teleoconch of 8 whorls with reticulate sculpture of 2 spiral cords (1<sup>st</sup> bigger) crossed by axial ribs, about 18 on last whorl, beads at each intersection. From 5<sup>th</sup> whorl a thin intermediate cord appears growing bigger every whorl. A 4<sup>th</sup> cord at the base of last whorl emerging from insertion of outer lip; border between base and columella highlighted by a weak cord. Columella short, columellar callus bordering a circular aperture with siphonal canal and anal sulcus well defined.

## Comparison

We compare *Specula bogii* n. sp. with *Specula naoae* Cecalupo & Perugia 2019 from Okinawa which differs mainly having light brown colour and shorter size, and *S. giamminellii* Cecalupo & Perugia, 2014 from South Madagascar which differs being colourless semitransparent and having sutures more impressed and whorls more convex.

## Etymology

*bogii*, after Cesare Bogi of Livorno (Italy), member of the Società Italiana di Malacologia (SIM).

***Specula giustii* n. sp.**  
(Fig. 10. D-F)

## Type material

holotype - (MNHN-IM-2000-36029) 2.13 x 0.77 mm, protoconch 0.37 x 0.30 mm, stn DW4820.

paratype 1 - (MNHN-IM-2000-36030) 2.12 x 0.75 mm, protoconch 0.38 x 0.30 mm, stn DW4820.

Paratype 2 - (MNHN-IM-2000-36031) 2.25 x 0.80 mm, protoconch 0.37 x 0.30 mm, stn DW4820.

## Type locality

stn DW4820, South Mayotte, spm 1, 295-336 m, Expedition BIOMAGLO.

## Distribution

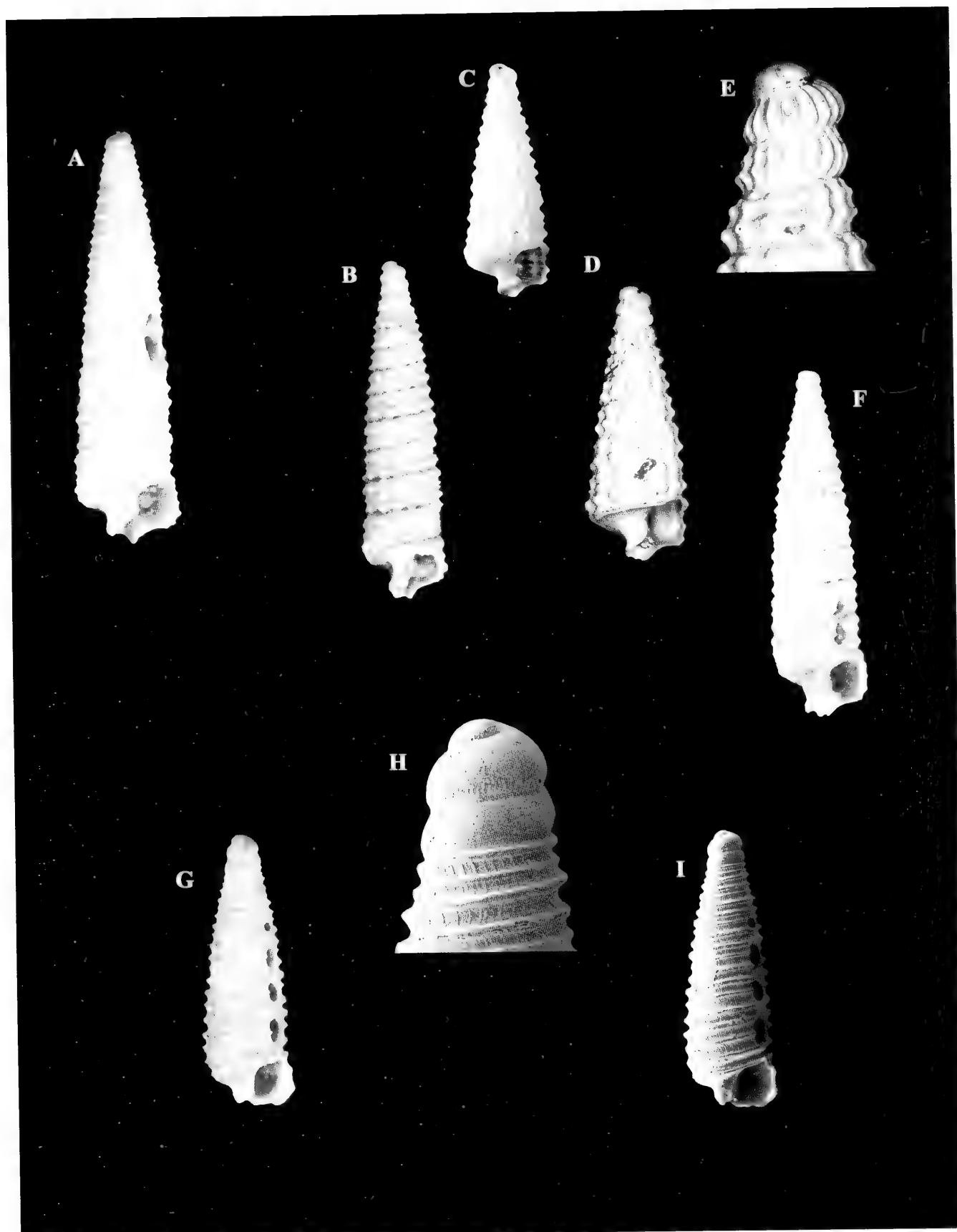
Known only from type locality.

## Material examined

stn DW4820, South Mayotte, spms 4, 295-336 m, Expedition BIOMAGLO

## Description of holotype

Shell small, conical, sutures impressed, colour pale yellowish. Protoconch small of 2.5-3 smooth convex whorls. Teleoconch of 5 whorls with reticulate sculpture of 3 spiral cords (the first closer) crossed by axial ribs, about 15 on last whorl, beads at each intersection. A 4<sup>th</sup>



**Fig. 9. [Comoro Is.].** **A.** *Retilaskeya chenui* (Jay & Drivas, 2002) (MNHN-IM-2012-25514), 7,20 x 1,88 mm, W Mayotte, stn DW4854; **B.** *Retilaskeya reunionensis* (Jay & Drivas, 2002) (MNHN-IM-2012-25515), 5,30 x 1,33 mm, South Mayotte, stn DW4820; **C-E.** *Retilaskeya reunionensis* (Jay & Drivas, 2002), 3,45 x 1,30 mm, South Mayotte, stn DW4820, **F.** *Retilaskeya reunionensis* (Jay & Drivas, 2002), 5,40 x 1,43 mm, South Mayotte, stn DW4820, **G-I.** *Seila gloriosa* n. sp., holotype (MNHN-IM-2000-36027), 3,07 x 1,00 mm, protoconch 0,52 x 0,42 mm, Glorieuses Is., stn DW4812

**Fig. 9. [Comoro Is.].** **A.** *Retilaskeya chenui* (Jay & Drivas, 2002) (MNHN-IM-2012-25514), 7,20 x 1,88 mm, a ovest di Mayotte, stn DW4854, **B.** *Retilaskeya reunionensis* (Jay & Drivas, 2002) (MNHN-IM-2012-25515), 5,30 x 1,33 mm, a sud di Mayotte, stn DW4820, **C-E.** *Retilaskeya reunionensis* (Jay & Drivas, 2002), 3,45 x 1,30 mm, a sud di Mayotte, stn DW4820, **F.** *Retilaskeya reunionensis* (Jay & Drivas, 2002), 5,40 x 1,43 mm, a sud di Mayotte, stn DW4820, **G-I.** *Seila gloriosa* n. sp., olotipo (MNHN-IM-2000-36027), 3,07 x 1,00 mm, protoconca 0,52 x 0,42 mm, Glorieuses Is., stn DW4812

## Distribution

Known only from type locality.

## Material examined

stn DW4800, Glorieuses Is., spms 2, 240-255 m; stn DW4807, Glorieuses Is., spm 1, 97-124 m; stn DW4820, S Mayotte, spms 8, 295-336 m; DW4846, W Mayotte, spms 2, 439-502 m; Expedition BIOMAGLO.

## Description of holotype

Shell medium, conical with impressed sutures. Protoconch cylindrical of 2.5 convex whorls; seen under SEM whorls are uniformly granulous. Colour colourless, glossy and transparent. Teleoconch of 7 whorls with reticulate sculpture of 3 spiral cords (1<sup>st</sup> less prominent), crossed by weaker axial ribs, about 18 on last whorl; beads at each intersection. A fourth beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a groove. Columella short and broad, obliquely truncated, columellar callus bordering a circular aperture, siphonal canal well defined. Colour pale yellow.

## Comparison

*Prolixodens vannonzii* n. sp. is particularly similar to *Prolixodens memorabilis* Cecalupo & Perugia, 2012 with wide Indopacific distribution. The main difference is in the cylindrical protoconcha of only 2.5 completely granulous whorls, particular found in all 13 specimens reported by the Comoro Is., while in *P. memorabilis* the cylindrical protoconch has 1.5 granulous whorls while the following show an axial sculpture, suture to suture. Similar protoconch is also found in *Tubercliopsis cataldinii* Cecalupo & Perugia, 2013 from Vanuatu which differs in the teleoconch with flat sides and much less impressed sutures. Tentatively inserted in the genus *Prolixodens*.

## Etymology

*vannonzii*, after Angelo Vannonzii of Roma, member of the Società Italiana di Malacologia (SIM) and expert of the family Caecidae.

***Retilaskeya chenui*** (Jay & Drivas, 2002)  
(Fig. 9. A)

*Seila chenui* Jay & Drivas, 2002: 37, pl II, fig. 59; pl 9, fig. F.

## Figured specimen

A - (MNHN-IM-2012-25514) 7.20 x 1.88 mm, protoconch damaged, stn DW4854.

## Type locality

La Reunion, off Saint-Gilles-les-Bains, 10-20 m.

## Distribution

SW Indian Ocean.

## Material examined

stn DW4854, W Mayotte, spm 1, 455-465 m, Expedition BIOMAGLO.

## Remarks

1st report from Comoro Is. For the sculpture of the teleoconch we believe the insertion in the genus *Retilaskeya* to be more appropriate.

***Retilaskeya reunionensis*** (Jay & Drivas, 2002)  
(Fig. 9. B, C-E, F)

*Seila reunionensis* Jay & Drivas, 2002: 37, pl II, fig. 60; pl 9, fig. G.

*Cerithiella reunionensis* (Jay & Drivas, 2002) in Cecalupo & P. 2014: 75, fig. 2 V; pag. 120, fig. 9 L, M.

## Figured specimen

B- (MNHN-IM-2012-25515) 5.30 x 1.33 mm, stn DW4820.  
C-E- 3.45 x 1.30 mm, South Mayotte, stn DW4820.  
F- 5.40 x 1.43 mm, South Mayotte, stn DW4820.

## Type locality

La Reunion, off Saint-Gilles-les-Bains, 10-20 m.

## Distribution

SW Indian Ocean.

## Material examined

stn DW4820, South Mayotte, spms 4, 295-336 m, Expedition BIOMAGLO.

## Remarks

1st report from Comoro Is. For the sculpture of the teleoconch we believe the insertion in the genus *Retilaskeya* to be more appropriate.

***Seila gloriosa*** n. sp.  
(Fig. 9. G-I)

## Type material

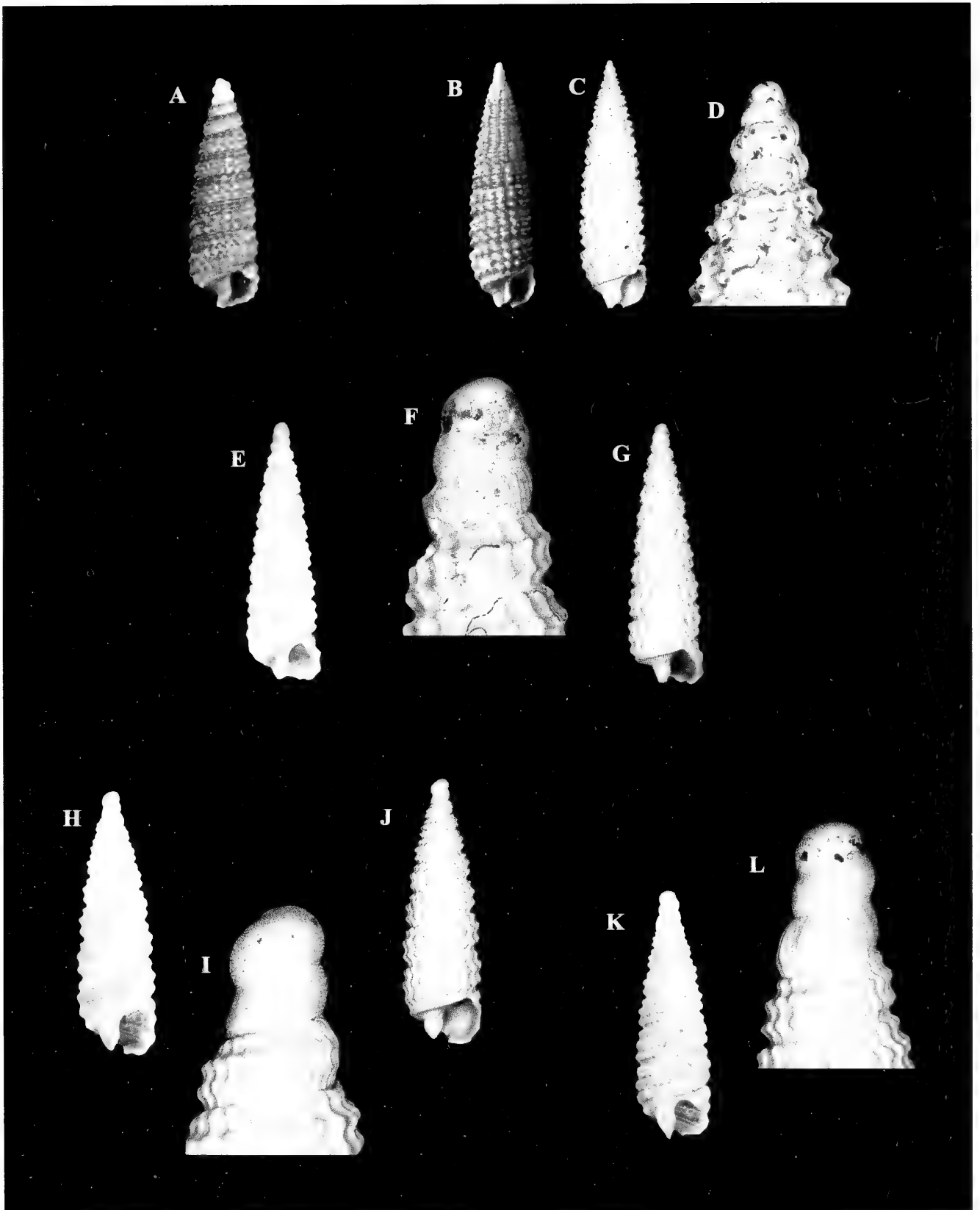
holotype - (MNHN-IM-2000-36027) 3.07 x 1.00 mm, protoconch 0.52 x 0.42 mm, stn DW4812.

## Type locality

Comoro Is., Glorieuses Is., 390-417 m.

## Distribution

Known only from type locality.



**Fig. 8. [Comoro Is.].** **A.** *Mendax metivieri* Jay & Drivas, 2002 (MNHN-IM-2012-25513), 3,30 x 1,33, mm, protoconch 0,45 x 0,32 mm, W Mayotte, stn DW4847, **B-D.** *Prolixodens leogattellii* n. sp., holotype (MNHN-IM-2000-36021), 4,75 x 1,28 mm, protoconch 0,50 x 0,27 mm, South Mayotte, stn DW4820, **E-G.** *Prolixodens martinot* n. sp., holotype (MNHN-IM-2000-36022), 4,10 x 1,15 mm, protoconch 0,43 x 0,27 mm, South Mayotte, stn DW4820, **H-J.** *Prolixodens vannozzii* n. sp. holotype (MNHN-IM-2000-36023), 3,50 x 1,00 mm, protoconch 0,45 x 0,27 mm, Glorieuses Is., stn DW4800, **K-L.** *Prolixodens vannozzii* n. sp. paratype 1 (MNHN-IM-2000-36024), 3,25 x 1,00 mm, protoconch 0,50 x 0,30 mm, Glorieuses Is. stn 4800

**Fig. 8. [Comoro Is.].** **A.** *Mendax metivieri* Jay & Drivas, 2002 (MNHN-IM-2012-25513), 3,30 x 1,33, mm, protoconca 0,45 x 0,32 mm, a ovest di Mayotte, stn DW4847, **B-D.** *Prolixodens leogattellii* n. sp., olotipo (MNHN-IM-2000-36021), 4,75 x 1,28 mm, protoconca 0,50 x 0,27 mm, a sud di Mayotte, stn DW4820, **E-G.** *Prolixodens martinot* n. sp., olotipo (MNHN-IM-2000-36022), 4,10 x 1,15 mm, protoconca 0,43 x 0,27 mm, a sud di Mayotte, stn DW4820, **H-J.** *Prolixodens vannozzii* n. sp. olotipo (MNHN-IM-2000-36023), 3,50 x 1,00 mm, protoconca 0,45 x 0,27 mm, Glorieuses Is., stn DW4800, **K-L.** *Prolixodens vannozzii* n. sp. paratipo 1 (MNHN-IM-2000-36024), 3,25 x 1,00 mm, protoconca 0,50 x 0,30 mm, Glorieuses Is. stn 4800

## Type locality

Comoro Is., S Mayotte, 295-336 m.

## Distribution

Known only from type locality.

## Material examined

stn DW4820, South Mayotte, spm 1, 295-336 m, Expedition BIOMAGLO.

## Description of holotype

Shell medium, conical with impressed sutures and slightly constricted base; colour uniformly dark orange. Protoconch conical of 4.5 convex whorls; seen under SEM first 1.5 embryonic whorls show an obsolete sculpture of spiral thread, next whorls show a sculpture of thin axial prosocline riblets (about 20 per whorl), suture to suture, regularly spaced. Teleoconch of 10 whorls with reticulate sculpture of 3 spiral cords (first two cords closer together), crossed by weaker axial ribs, about 18 on last whorl; beads at each intersection. A fourth beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a groove. Columella short and broad, obliquely truncated, columellar callus bordering an oval aperture; anal sulcus and siphonal canal well defined.

## Comparison

*Prolixodens leogattellii* n. sp. for its shape and size can be confused with species of the genus *Synthopsis* Laseyron, 1956, from which it differs for the sculpture and protoconch. It is compared for the protoconch with *Prolixodens obscura* (Cecalupo & Perugia, 2012) from Philippines, having smaller dimensions and dark brown colour, for the dimensions with *P. montrouzieri* Cecalupo & Perugia, 2017 from New Caledonia which differs in colour and cylindrical protoconch. *P. lutea* Cecalupo & Perugia, 2012 with wide Indopacific distribution differs in the more cylindrical shape and the darker colour.

## Etymology

*leogattellii*, after Leonardo Gattelli of Russi (Ravenna, Italy), son of Raffaele owner of Aquae Mundi Museum.

***Prolixodens martinoi* n. sp.**  
(Fig. 8. E-G)

## Type material

holotype - (MNHN-IM-2000-36022) 4.10 x 1.15 mm, protoconch 0.43 x 0.27 mm, stn DW 4820.

## Type locality

Comoro Is., South Mayotte, 295-336 m.

## Distribution

Known only from type locality.

## Material examined

stn DW4820, South Mayotte, spm 1, 295-336 m, Expedition BIOMAGLO.

## Description of holotype

Shell medium, conical regularly increasing with impressed sutures. Colour whitish, protoconch and columella darker. Protoconch cylindrical of 2.5/3 convex whorls; seen under SEM first 1.5 embryonic whorls are granulous, last shows a sculpture of thin axial prosocline riblets, suture to suture, regularly spaced. Teleoconch of 8.5 whorls with reticulate sculpture of 3 spiral cords (intermediate more prominent) crossed by weaker axial ribs, about 18 on last whorl; beads at each intersection. A fourth beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by an angle. Columella short and broad, obliquely truncated, columellar callus bordering a slightly damaged aperture.

## Comparison

*Prolixodens martinoi* n. sp. is compared with *Prolixodens whaaporum* Cecalupo & Perugia, 2017 from New Caledonia having a similar protoconch but sutures more impressed, whorls more convex and being bicolour.

## Etymology

*martinoi*, after Antonio Martino of Marina di Gioiosa Ionica (Reggio Calabria, Italy) fisherman, in recognition for his continuous collaboration in the research of molluscs and crustaceans of the Ionian deep waters.

***Prolixodens vannonzii* n. sp.**  
(Fig. 8. H-L)

## Type material

holotype - (MNHN-IM-2000-36023) 3.50 x 1.00 mm, protoconch 0.45 x 0.27 mm, stn DW4800.  
paratype 1 - (MNHN-IM-2000-36024) 3.25 x 1.00 mm, protoconch 0.50 x 0.30 mm, stn DW4800.  
paratype 2 - (MNHN-IM-2000-36025) 2.55 x 0.76 mm, protoconch 0.47 x 0.30 mm, stn DW4807.  
paratype 3 - (MNHN-IM-2000-36026) 3.20 x 1.10 mm, protoconch 0.50 x 0.32 mm, stn DW4820.

## Type locality

Comoro Is., Glorieuses Is., 240-255 m.

***Joculator zucconi* n. sp.**  
(Fig. 7. D-F)

**Type material**

holotype - (MNHN-IM-2000-36020) 2.76 x 0.93 mm, protoconch 0.52 x 0.24 mm, stn DW4789.

**Type locality**

Comoro Is., Geyser Bank, 340-342 m.

**Distribution**

Known only from type locality.

**Material examined**

stn DW4789, Geyser Bank, spm 1, 340-342 m, Expedition BIOMAGLO.

**Description of holotype**

Shell small, conical, outer lip expanded, impressed sutures. Protoconch conical of 4.5 smooth convex whorls; colour whitish, semitransparent. Teleoconch of 6.75 whorls with reticulate sculpture of 3 spiral cords (thin intermediate cord appears on 3<sup>rd</sup> whorl growing bigger every whorl) crossed by weaker axial ribs, about 18 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a weaker cord. Columella short and broad, obliquely truncated, with surface crossed by wrinkled thin threads extended also on the base; aperture incomplete with outer lip expanded. Colour pale red brown, first spiral cord darker.

**Comparison**

*Joculator zucconi* n. sp. is compared with *Joculator* species 1 Cecalupo & Perugia, 2019 (pl. 11, figs. 3a-c) from Okinawa different being slightly thinner but more inflated with a slightly constricted base, the sculpture of the teleoconch has a thinner intermediate spiral cord, obsolete in the central part of the spire. It is also compared with *Synthopsis demissa* Laseyron, 1956 from North Australia different having a colour straw and a the first spiral cord of the teleoconch smaller.

**Etymology**

*zucconi*, after Dario Zuccon, engineer at the MNHN Molecular Systematics lab, in recognition for his contribution to the production of numerous integrative taxonomy and phylogeny research articles.

***Marshallopsis blanda***  
Cecalupo & Perugia, 2012  
(Fig. 7. G-I)

**Figured specimen**

G-I - (MNHN-IM-2012-25512) 1.97 x 0.60 mm, protoconch 0.50 x 0.24 mm, stn DW4820.

**Type locality**

Philippines, Pamilacan Is., up to 90 m.

**Distribution**

Wide Indo-Pacific distribution.

**Material examined**

stn DW4820, South Mayotte, spms 2, 295-336 m; stn DW4826, South Mayotte, spm 1, 489-496 m, Expedition BIOMAGLO.

**Remarks**

1st report from Comoro Is. Reported by Blatterer (2019) from Red Sea.

***Mendax metivieri* Jay & Drivas, 2002**  
(Fig. 8. A)

*Mendax metivieri* Jay & Drivas, 2002: 3, pl II, fig. 49; pl 8, fig. B.

**Figured specimen**

A - (MNHN-IM-2012-25513) 3.30 x 1.02 mm, protoconch 0.45 x 0.32 mm, stn DW4847.

**Type locality**

La Reunion, off Saint-Gilles-les-Bains, 30-50 m.

**Distribution**

SW Indian Ocean; W Mayotte, stn DW4847.

**Material examined**

stn DW4820, South Mayotte, spms 7, 295-336 m; stn DW4826, South Mayotte, spm 1, 489-496 m, DW4826, W Mayotte, spm 1, 439-502 m; stn DW4847, W Mayotte, spms 4, 738-736 m; stn DW4865, SE Mayotte, spm 1, 474-505 m; stn DW4871, NE Mayotte, spm 1, 462-486 m, Expedition BIOMAGLO.

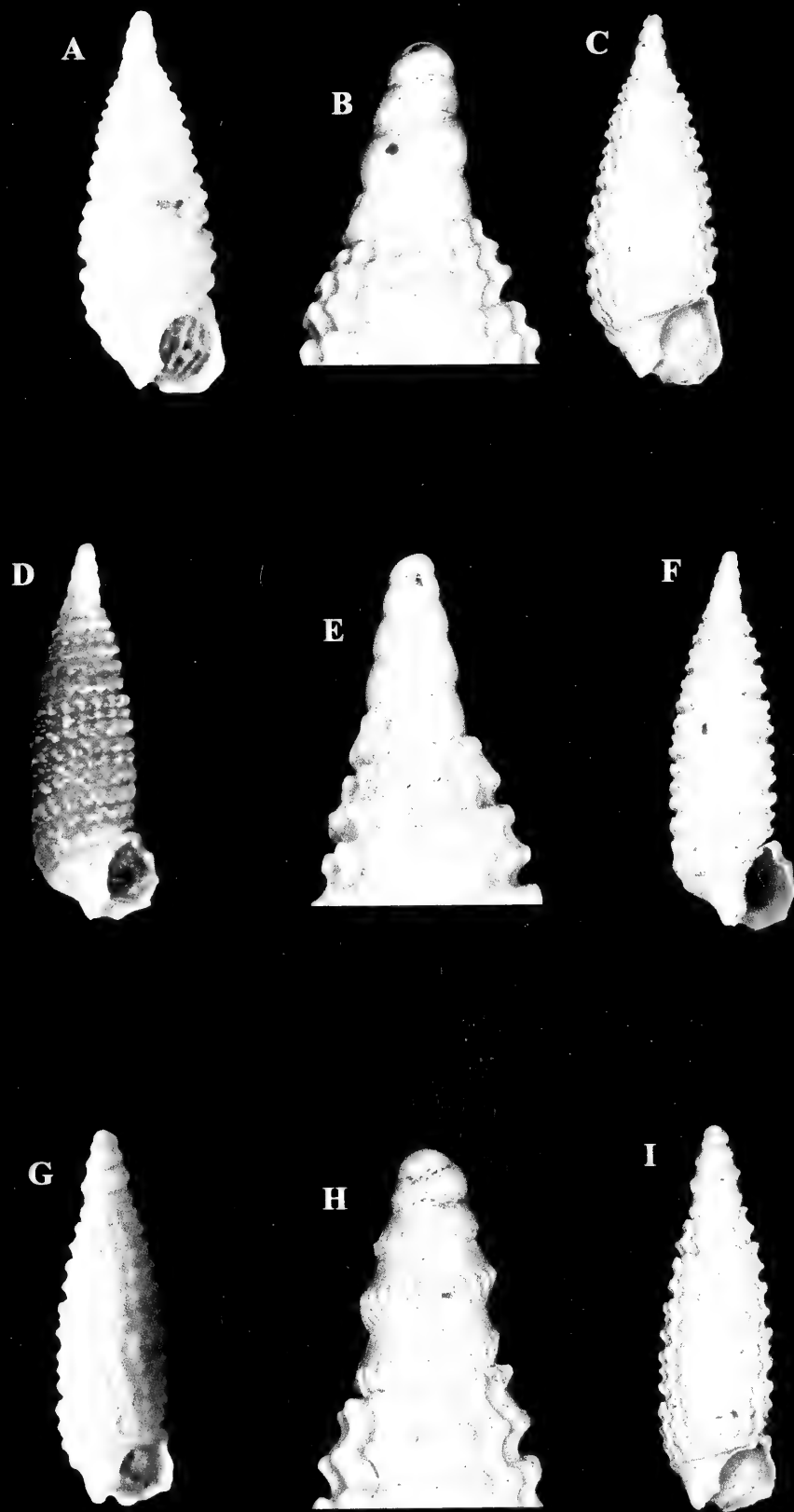
**Remarks**

1st report from Comoro Is.

***Prolixodens leogattellii* n. sp.**  
(Fig. 8. B-D)

**Type material**

holotype - (MNHN-IM-2000-36021) 4.75 x 1.28 mm, protoconch 0.50 x 0.27 mm, stn DW4820.



**Fig. 7. [Comoro Is.]. A-C.** *Joculator zaharias* n. sp., holotype (MNHN-IM-2000-36019), 2.67 x 0.97 mm, protoconch 0.42 x 0.24 mm, South Mayotte, stn DW4820; **D-F.** *Joculator zucconi* n. sp., holotype (MNHN-IM-2000-36020), 2.76 x 0.93 mm, protoconch 0.52 x 0.24 mm, Geyser Bank, stn DW4789; **G-I.** *Marshallopsis blanda* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25512), 1.97 x 0.60 mm, protoconch 0.50 x 0.24 mm, South Mayotte, stn DW4820

**Fig. 7. [Comoro Is.]. A-C.** *Joculator zaharias* n. sp., olotipo (MNHN-IM-2000-36019), 2,67 x 0,97 mm, protoconca 0,42 x 0,24 mm, a sud di Mayotte, stn DW4820; **D-F.** *Joculator zucconi* n. sp., olotipo (MNHN-IM-2000-36020), 2,76 x 0,93 mm, protoconca 0,52 x 0,24 mm, Geyser Bank, stn DW4789; **G-I.** *Marshallopsis blanda* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25512), 1,97 x 0,60 mm, protoconca 0,50 x 0,24 mm, a sud di Mayotte, stn DW4820



MNHN coastal and offshore expeditions, including as second captain of R/V *Antéa* during the BIOMAGLO research cruise, leading to the discovery of many new species.

*Joculator* cfr. *recisus* Cecalupo & Perugia, 2012  
(Fig. 6. J, K)

### Figured specimen

J-K - (MNHN-IM-2012-25511) 1.17 x 0.55 mm, protoconch 0.27 x 0.18 mm, stn DW4860.

### Type locality

Comoro Is., NW Mayotte, 486-646 m.

### Distribution

Known only from type locality.

### Material examined

stn DW4860, NW Mayotte, spm 1, 486-646 m, Expedition BIOMAGLO.

### Description

Shell very small, perfectly oval, moderately impressed sutures. Protoconch short, cylindrical of 3.5 smooth convex whorls, colour whitish, opaque. Teleoconch of 3.5 whorls with reticulate sculpture of 3 spiral cords crossed by weaker axial ribs, about 17 on last whorl; beads at each intersection. A fourth beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a cord. Columella short and broad, obliquely truncated, crossed by thin threads columellar callus bordering an oval aperture; apertura damaged. Colour orange.

### Remarks

It is a unique specimen in not perfect condition, slightly eroded and probably slightly decoloured. There are small differences with the *Joculator recisus* holotype which has a larger size with the same number of whorls (1.47x0.68 mm) and a thinner protoconch (0.27x0.22 mm). First report from Comoro Is.

*Joculator saguili* Cecalupo & Perugia, 2013  
not figured

### Type locality

SE Mayotte, 455-487 m.

### Distribution

Indo-Pacific range.

### Material examined

stn DW4864, SE Mayotte, spm 1, 455-487 m, Expedition BIOMAGLO.

### Remarks

First report from Comoro Is.

*Joculator zahariasi* n. sp.  
(Fig. 7. A-C)

### Type material

holotype - (MNHN-IM-2000-36019) 2.67 x 0.97 mm, protoconch 0.42 x 0.24 mm, stn DW4820.

### Type locality

Comoro Is., South Mayotte, 295-336 m.

### Distribution

Known only from type locality.

### Material examined

stn DW4820, South Mayotte, spm 1, 295-336 m, Expedition BIOMAGLO.

### Description of holotype

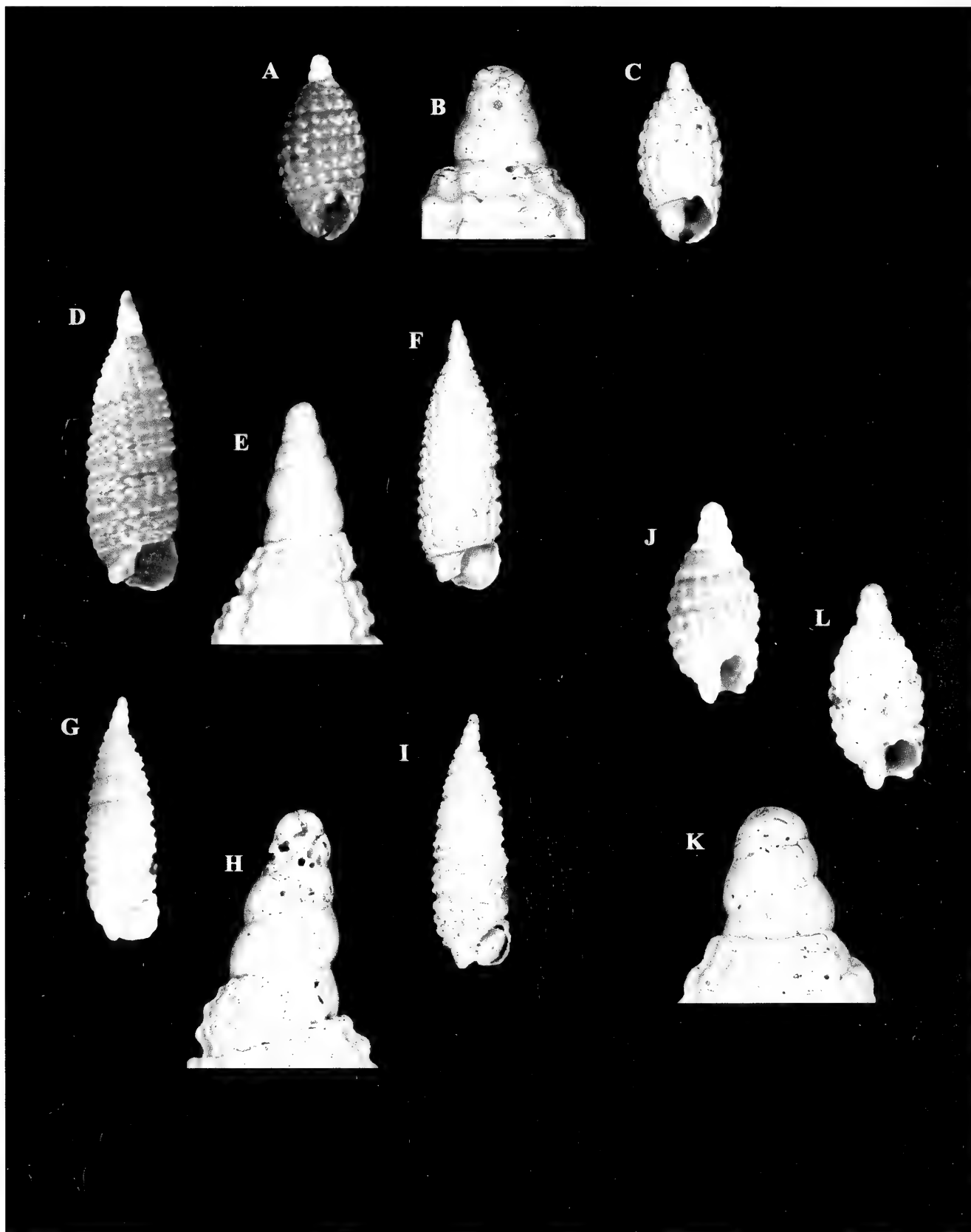
Shell small, conical, impressed sutures, colour uniformly whitish. Protoconch slightly conical of 4.5 smooth convex whorls. Teleoconch of 5.5 whorls with reticulate, sculpture of 3 equal spiral cords crossed by axial ribs, about 18 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a cord. Columella short and broad, obliquely truncated, crossed by thin threads; columellar callus bordering an oval aperture; siphonal canal and anal sulcus defined.

### Comparison

*Joculator zahariasi* n. sp. is compared with: *Joculator johnkazui* Cecalupo & Perugia, 2018 from Papua New Guinea which differs in the more inflated conical shape, sandy yellow colour and smaller dimensions 1.83 vs 2.67 mm and *Joculator nitidus* Cecalupo & Perugia 2012 from Philippines different having colour pale yellowish, slightly inflated shape and larger protoconch 0.60 vs 0.42 mm.

### Etymology

*zahariasi*, after Paul Zaharias, molecular systematist Ph. D. student at MNHN, and a participant in the BIOMAGLO expedition.



**Fig. 6. [Comoro Is.]. A-C.** *Joculator minutissimus* (Thiele, 1925) (MNHN-IM-2012-25510), 1,37 x 0,65 mm, protoconch 0,25 x 0,20 mm, W Mayotte, stn DW4847; **D-F.** *Joculator pierresamueli* n. sp., holotype (MNHN-IM-2000-36017), 3,30 x 1,03 mm, protoconch 0,55 x 0,27 mm, Glorieuses Is., stn DW4807; **G-I.** *Joculator pierresamueli* n. sp., paratype 1 (MNHN-IM-2000-36018), 3,06 x 0,93 mm, protoconch 0,50 x 0,24 mm, NW Mayotte, stn DW4860; **J-K.** *Joculator* cfr. *recisus* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25511), 1,17 x 0,55 mm, protoconch 0,27 x 0,18 mm, NW Mayotte, stn DW4860.

**Fig. 6. [Comoro Is.]. A-C.** *Joculator minutissimus* (Thiele, 1925) (MNHN-IM-2012-25510), 1,37 x 0,65 mm, protoconca 0,25 x 0,20 mm, a ovest di Mayotte, stn DW4847; **D-F.** *Joculator pierresamueli* n. sp., olotipo (MNHN-IM-2000-36017), 3,30 x 1,03 mm, protoconca 0,55 x 0,27 mm, Glorieuses Is., stn DW4807; **G-I.** *Joculator pierresamueli* n. sp., paratipo 1 (MNHN-IM-2000-36018), 3,06 x 0,93 mm, protoconca 0,50 x 0,24 mm, a nord ovest di Mayotte, stn DW4860; **J-K.** *Joculator* cfr. *recisus* Cecalupo & Perugia, 2012 (MNHN-IM-2012-25511), 1,17 x 0,55 mm, protoconca 0,27 x 0,18 mm, a nord ovest di Mayotte, stn DW4860

## Material examined

stn DW4820, South Mayotte, spm 1, 295-336 m, Expedition BIOMAGLO.

## Description of holotype

Shell small, conical inflated, constricted base, impressed sutures; colour uniformly whitish. Protoconch slightly conical of 4/4.5 smooth convex whorls. Teleoconch of 4.5 slightly convex whorls with reticulate sculpture of 3 equal spiral cords crossed by axial ribs, about 15 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a cord. Columella short and broad, obliquely truncated, crossed by thin threads, columellar callus bordering an oval aperture; siphonal canal and anal sulcus defined.

## Comparison

*Joculator latrechei* n. sp. is compared with 2 species reported from South Madagascar, *Joculator vandela* and *J. tsirivelo*, both Cecalupo & Perugia, 2014, with similar shape; the first differs being smaller, 1.72 vs 2.20 mm, sandy yellow in colour and having a protoconch smaller and less conical, the second has colour yellow and both have a clear different border between base and columella.

## Etymology

*latrechei*, after Abderrhamane Latrèche, MNHN support staff, in recognition for his permanent good humor and good will to service malacology personnel and visitors alike.

***Joculator minutissimus*** (Thiele, 1925)  
(Fig. 6. A-C)

*Cerithiopsis minutissima* Thiele, 1925: 124, tafle 10, fig. 5.

## Figured specimen

A-C - (MNHN-IM-2012-25510) 1.37 x 0.65 mm, protoconch 0.25 x 0.20 mm, stn DW4847.

## Type locality

Indonesia, Sumatra, Nias Is.

## Distribution

SW Indian Ocean.

## Material examined

stn DW4847, W Mayotte, spm 1, 738-736 m, Expedition BIOMAGLO.

## Remarks

First report from Comoro Is. *Joculator* cfr. *minutissimus* is reported by Blatterer, 2019: 237, Pl. 114, figs. 18a-b, from Red Sea.

***Joculator pierresamueli*** n. sp.  
(Fig. 6. D-E, G-I)

## Type material

holotype - (MNHN-IM-2000-36017) 3.30 x 1.03 mm, protoconch 0.55 x 0.27 mm, stn DW4807.  
paratype 1 - (MNHN-IM-2000-36018) 3.06 x 0.93 mm, protoconch 0.50 x 0.24 mm, stn DW4860.

## Type locality

Comoro Is., Glorieuses Is., 97-124 m.

## Distribution

Known only from Comoro.

## Material examined

stn DW4807, Glorieuses Is., N/O "Antea", 97-124 m; stn DW4860, NW Mayotte, N/O "Antea", 486-646 m, Expedition BIOMAGLO.

## Description of holotype

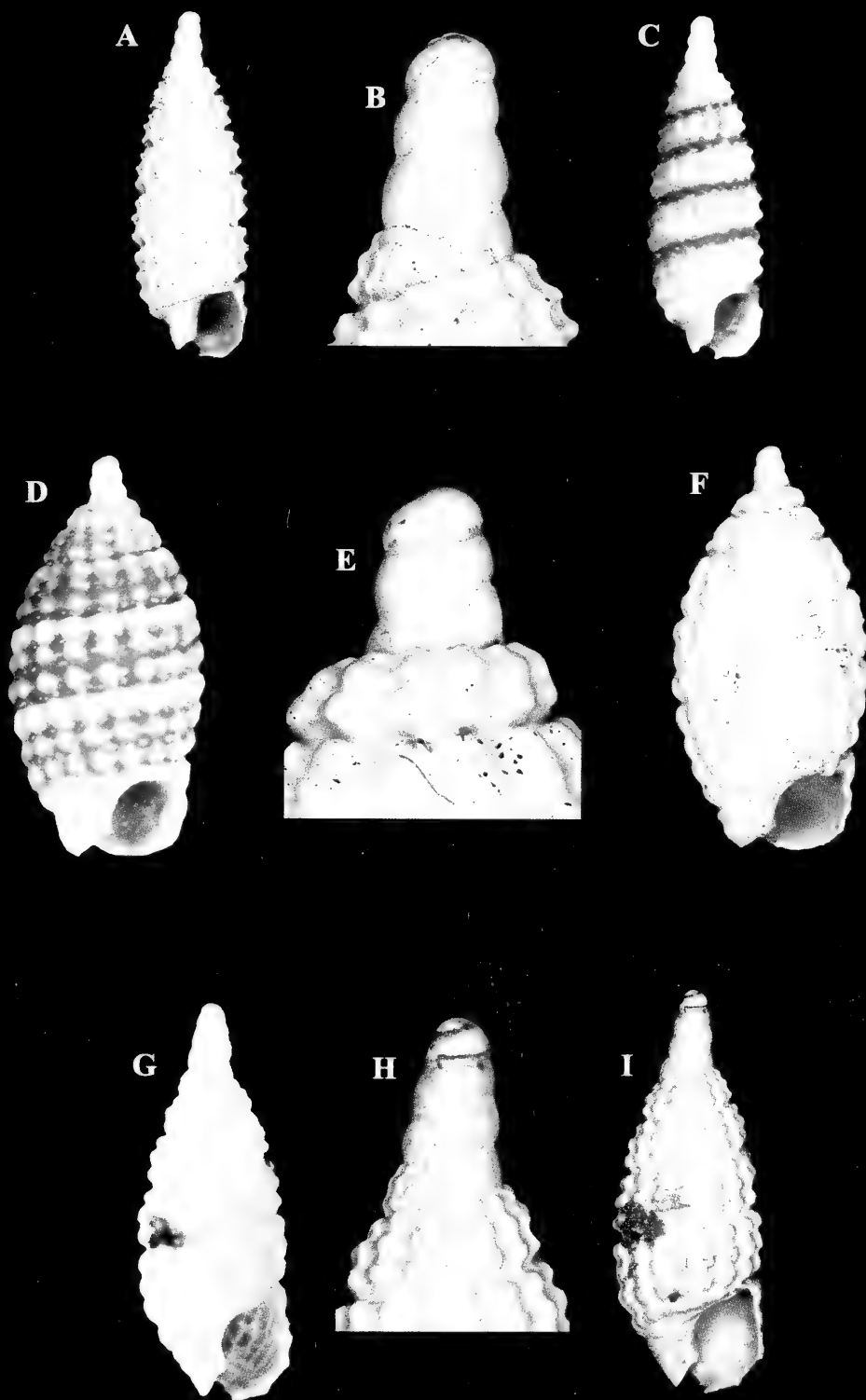
Shell medium, conical, impressed sutures. Protoconch conical of 4.5 smooth convex whorls; colour yellowish, opaque. Teleoconch of 7 whorls with reticulate sculpture of 3 spiral cords (slightly narrower intermediate) crossed by weaker axial ribs, about 18 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a cord. Columella short and broad, obliquely truncated, with surface crossed by thin threads; columellar callus bordering a circular aperture, siphonal canal well defined. Colour sandy yellow.

## Comparison

*Joculator pierresamueli* n. sp. is compared with 2 species of the genus *Synthopsis* quite similar for shape and size: *Synthopsis bongiardinoi* Cecalupo & Perugia, 2012 from Philippines and *S. shoujii* Cecalupo & Perugia, 2019 from Okinawa. The first species has a more inflated shape, the second has the spiral cords equal in size and limit between base and columella different, highlighted by an angle, both species obviously have minute grains in the sutures of the protoconch while in *Joculator pierresamueli* n. sp. are missing.

## Etymology

*pierresamueli*, after Pierre Samuel, a participant in many



**Fig. 5. [Comoro Is.]. A-C.** *Joculator keszlerae* n. sp., holotype (MNHN-IM-2000-36014), 2,20 x 0,75 mm, protoconch 0,40 x 0,22 mm, South Mayotte, stn DW4820; **D-F.** *Joculator koluae* n. sp., holotype (MNHN-IM-2000-36015), 2,70 x 1,30 mm, protoconch 0,35 x 0,25 mm, W Mayotte, stn DW4847; **G-I.** *Joculator latrechei* n. sp., holotype (MNHN-IM-2000-36016), 2,20 x 0,82 mm, protoconch 0,42 x 0,24 mm, South Mayotte, stn DW4820

**Fig. 5. [Comoro Is.]. A-C.** *Joculator keszlerae* n. sp., olotipo (MNHN-IM-2000-36014), 2,20 x 0,75 mm, protoconca 0,40 x 0,22 mm, a sud di Mayotte, stn DW4820; **D-F.** *Joculator koluae* n. sp., olotipo (MNHN-IM-2000-36015), 2,70 x 1,30 mm, protoconca 0,35 x 0,25 mm, a ovest di Mayotte, stn DW4847; **G-I.** *Joculator latrechei* n. sp., olotipo (MNHN-IM-2000-36016), 2,20 x 0,82 mm, protoconca 0,42 x 0,24 mm, a sud d. Mayotte, stn DW4820

***Joculator keszlerae* n. sp.**  
(Fig. 5. A-C)

**Type material**

holotype - (MNHN-IM-2000-36014) 2.20 x 0.75 mm, protoconch 0.40 x 0.22 mm, stn DW4820.

**Type locality**

Comoro Is., South Mayotte, 295-336 m.

**Distribution**

SW Indian Ocean.

**Material examined**

stn DW4820, South Mayotte, spm 1, 295-336 m, Expedition BIOMAGLO.

**Description of holotype**

Shell small, conical, impressed sutures. Protoconch sub-cylindrical of 3.5 smooth convex whorls, colour white, opaque. Teleoconch of 5.5 slightly convex whorls with reticulate sculpture of 3 spiral cords crossed by weaker axial ribs, about 18 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by an angle. Columella short and broad, obliquely truncated, columellar callus bordering an oval aperture; siphonal canal and anal sulcus well defined. Colour white with 1<sup>st</sup> spiral spiral cords orange.

**Comparison**

*Joculator keszlerae* n. sp. is compared with *J. massimiliano* and *J. voncoseli*, both Cecalupo & Perugia, 2012 from Philippines, and *Cerithiopsis pulvis* (Issel, 1869) from Red Sea; these 3 species have the same colour with the first spiral cord orange but they differ having a conical protoconch.

**Etymology**

*keszlerae*, after Louise Keszler, volunteer with the MNHN malacology team and a participant in the BIOMAGLO expedition.

***Joculator koluae* n. sp.**  
(Fig. 5. D-F)

**Type material**

holotype - (MNHN-IM-2000-36015) 2.70 x 1.30 mm, protoconch 0.35 x 0.25 mm, stn DW4847.

**Type locality**

Comoro Is., W Mayotte, 738-736 m.

**Distribution**

SW Indian Ocean.

**Material examined**

stn DW4847, W Mayotte, spm 1, 738-736 m, Expedition BIOMAGLO.

**Description of holotype**

Shell small, perfectly oval, moderately impressed sutures. Protoconch short, cylindrical of 3.5 smooth convex whorls, colour white, opaque. Teleoconch of 5.25 whorls with reticulate sculpture of 3 spiral cords (intermediate narrower) crossed by weaker axial ribs, about 16 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a cord. Columella short and broad, obliquely truncated, crossed by thin threads columellar callus bordering an oval aperture; siphonal canal and anal sulcus well defined. Colour orange with 1<sup>st</sup> spiral spiral cords white, columella paler.

**Comparison**

Many are the species of *Joculator* with similar oval shape and short protoconch to differentiate them are the dimensions and mainly the colour; we compare *Joculator koluae* n. sp. with *J. quoggiottoi* Cecalupo & Perugia, 2012 from Philippines, also reported from Okinawa (Cecalupo & Perugia, 2019), having similar bicolouration, red brown not orange, and protoconch larger and *J. occultus* Cecalupo & Perugia, 2012 from Philippines, larger in size with a conical short protoconch, colour orange but with first spiral cord red brown.

**Etymology**

*koluae*, after Karine Olu-Le Roy, research scientist at IF-REMER, co-PI of the BIOMAGLO expedition, and the initiator of many other deep-sea expeditions.

***Joculator latrechei* n. sp.**  
(Fig. 5. G-I)

**Type material**

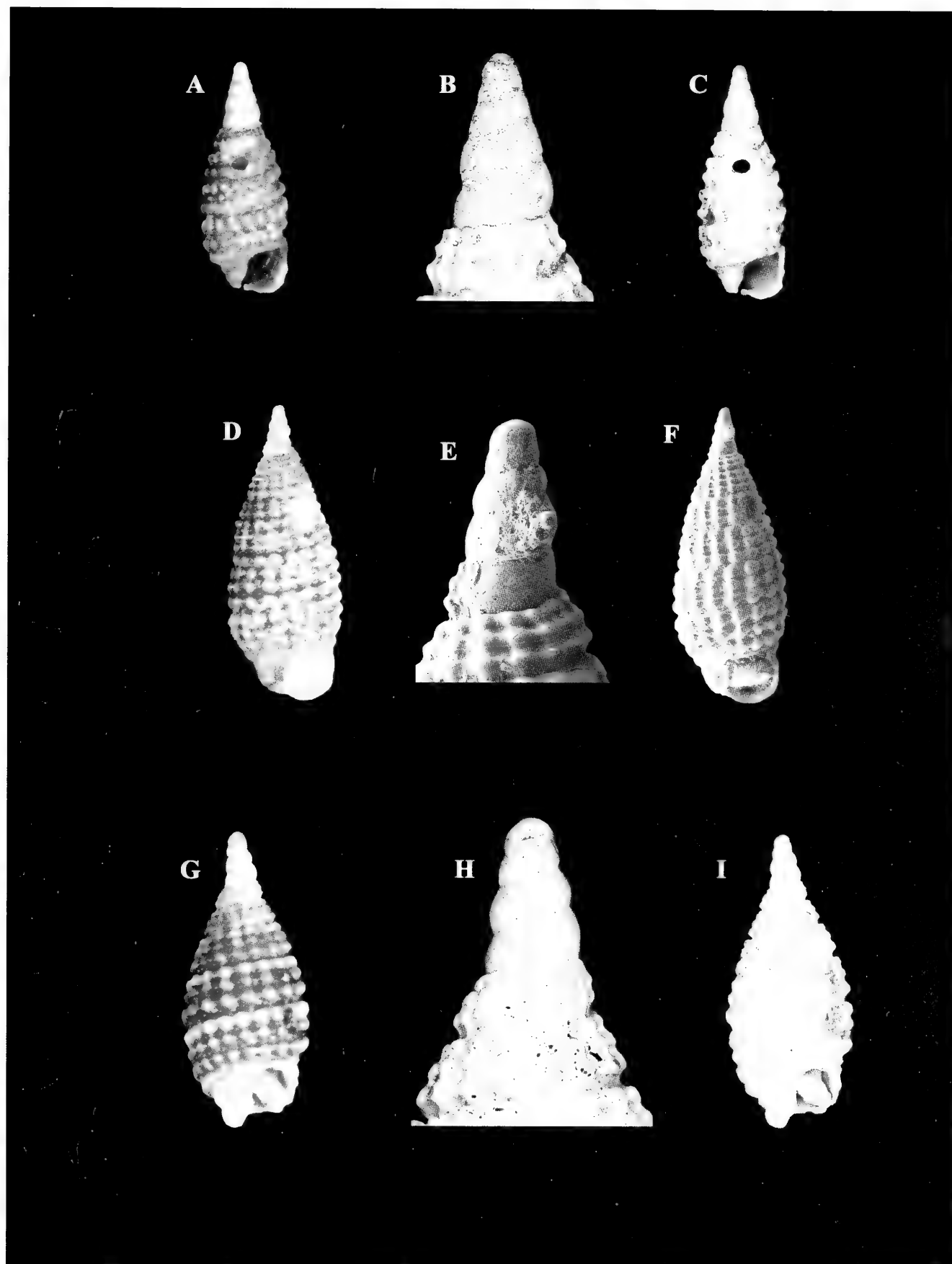
Holotype - (MNHN-IM-2000-36016) 2.20 x 0.82 mm, protoconch 0.42 x 0.24 mm, DW4820.

**Type locality**

Comoro Is., South Mayotte, 295-336 m.

**Distribution**

Known only from type locality.



**Fig. 4. [Comoro Is.]. A-C.** *Horologica* cf. *macrocephala* Laseyron, 1956 (MNHN-IM-2012-25509), 1.70 x 0.62 mm, protoconch 0.55 x 0.27 mm, Glorieuses Is., stn DW4813, **D-F.** *Joculator brisseti* n. sp. holotype (MNHN-IM-2000-36012), 3.06 x 1.20 mm, protoconch 0.52 x 0.25 mm, NW Mayotte, stn DW4848, **G-I.** *Joculator grimaldae* n. sp. holotype (MNHN-IM-2000-36013), 2.35 x 1.02 mm, protoconch 0.45 x 0.26 mm, NW Mayotte, stn DW4860

**Fig. 4. [Comoro Is.]. A-C.** *Horologica* cf. *macrocephala* Laseyron, 1956 (MNHN-IM-2012-25509), 1.70 x 0.62 mm, protoconcha 0.55 x 0.27 mm, Glorieuses Is., stn DW4813, **D-F.** *Joculator brisseti* n. sp. olotipo (MNHN-IM-2000-36012), 3.06 x 1.20 mm, protoconcha 0.52 x 0.25 mm, a nord ovest di Mayotte, stn DW4848, **G-I.** *Joculator grimaldae* n. sp. olotipo (MNHN-IM-2000-36013), 2.35 x 1.02 mm, protoconcha 0.45 x 0.26 mm, nord ovest di Mayotte, stn DW4860

## Distribution

North Australia, Comoro Is.

## Material examined

stn DW4813, Glorieuses Is., spm 1, 583-614 m, Expedition BIOMAGLO.

## Remarks

First report from Comoro Is.

*Joculator brisseti* n. sp.  
(Fig. 4. D-F)

## Type material

holotype - (MNHN-IM-2000-36012) 3.06 x 1.20 mm, protoconch 0.52 x 0.25 mm, stn DW4848.

## Type locality

Comoro Is., NW Mayotte, 399-402 m.

## Distribution

SW Indian Ocean.

## Material examined

stn DW4848, NW Mayotte, spm 1, 399-402 m, Expedition BIOMAGLO.

## Description of holotype

Shell medium, conical inflated, bottle-shaped with constricted last whorl, moderately impressed sutures. Protoconch conical, acute of 4.5 smooth convex whorls; colour yellowish. Teleoconch of 6.5 convex whorls with reticulate sculpture of 3 very close spiral cords crossed by axial ribs, about 16 on last whorl; rounded beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a cord. Columella short and broad, obliquely truncated, columellar callus bordering a circular aperture; siphonal canal and anal sulcus well defined. Colour dark orange, columella yellowish, beads whitish.

## Comparison

*Joculator brisseti* n. sp. for its bottle-shaped outline and acute protoconch is compared to *J. melania* Laseron, 1956 from North Australia different mainly for its colour "deep brown, almost black". The genus *Joculator* including many species that have a certain similarity, we mention: *J. acuminatus* and *J. variabilis*, both Cecalupo & Perugia, 2012 with wide Indopacific distribution, the first uniform colour orange and protoconch broader

at the base, the second with a different teleoconch sculpture, *J. brusonii* Cecalupo & Perugia, 2013 from Vanuatu but conical with orange uniform colour and protoconch broader at the base.

## Etymology

*brisseti*, after Julien Brisset, biodiversity data manager with MNHN Natural Heritage Unit, in recognition for his curation of the Museum Expeditions website.

*Joculator grimaldae* n. sp.  
(Fig. 4. G-I)

## Type material

holotype - (MNHN-IM-2000-36013) 2.35 x 1.02 mm, protoconch 0.45 x 0.26 mm, stn DW4860.

## Type locality

Comoro Is., NW Mayotte, 486-646 m.

## Distribution

SW Indian Ocean.

## Material examined

stn DW4860, NW Mayotte, spm 1, 486-646 m, Expedition BIOMAGLO.

## Description of holotype

Shell small, oval with impressed sutures. Protoconch conical of 4.5 convex whorls, colour yellowish. Teleoconch of 4.5 whorls with reticulate sculpture of 3 spiral cords crossed by weaker axial ribs, about 18 on last whorl; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a cord. Columella short and broad, obliquely truncated, columellar callus bordering a damaged aperture. Colour orange with 1<sup>st</sup> spiral spiral cords white.

## Comparison

*Joculator grimaldae* n. sp. has a colour very similar to *Joculator koluae* n. sp., here reported, but completely different in shape. It can be compared with *J. arduinii* Cecalupo & Perugia, 2012 with wide Indo-Pacific diffusion which differs mainly in having a cylindrical protoconch and larger dimensions.

## Etymology

*grimalae*, after Danièle Grimal-Urban, a volunteer of many years with the MNHN malacology team, and a skilfull sorter of micromolluscs from bottom samples.



**Distribution**

Indo-Pacific range.

**Material examined**

stn DW4789, Geyser Bank, spm 1, 340-342 m; stn DW4800, Glorieuses Is., spm 1, 240-255 m. Expedition BIOMAGLO.

**Remarks**

1st report from Comoro Is.

*Horologica diffusa*  
Cecalupo & Perugia, 2012  
not figured

**Type locality**

Philippines, Cebu, Moalboal, 2 m.

**Distribution**

Indo-Pacific range.

**Material examined**

stn DW4871, NE Mayotte, spm 1, 462-486 m, Expedition BIOMAGLO.

**Remarks**

1st report from Comoro Is.

*Horologica jayi* Cecalupo & Perugia, 2012  
not figured

**Type locality**

Philippines, Mactan Is., Olango Channel, 60-80 m.

**Distribution**

Indo-Pacific range.

**Material examined**

stn DW4871, NE Mayotte, spm 1, 462-486 m, Expedition BIOMAGLO.

**Remarks**

1st report from Comoro Is.

*Horologica lofficiali* n. sp.  
(Fig. 3. H-J)

*Horologica* sp. 2, in Nützel, 1998: pl. 4, figs. P-R.

**Type material**

holotype - (MNHN-IM-2000-36011) 1.70 x 0.57 mm, protoconch 0.55 x 0.21 mm, stn DW4864.

**Type locality**

Comoro Is., Mayotte, spm 1, 455-487 m.

**Distribution**

Known only from type locality.

**Material examined**

stn DW4864, Mayotte, spm 1, 455-487 m, Expedition BIOMAGLO.

**Description of holotype**

Shell very small, conical inflated with slightly constricted last whorl, sutures impressed. Colour pale orange, first whorls of protoconch whitish, opaque. Protoconch conical, slender of 4.5 smooth slightly convex whorls. Teleoconch of 4.5 whorls with reticulate sculpture of 2 spiral cords (1<sup>st</sup> bigger) crossed by weaker axial ribs, about 14 on last whorl; beads at each intersection; a fourth beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a weak cord. Columella short and broad, obliquely truncated, crossed by thin crisp threads; columellar callus bordering an oval aperture; siphonal canal and anus sulcus defined.

**Comparison**

*Horologica lofficiali* n. sp. corresponds to the species illustrated by Nützel, 1998 from Lizard Is. (Australia) as *Horologica* sp. 2. The slender shape of the protoconch is common to many species of *Horologica*, easily separable by the different colour, and *Joculator* different by the sculpture of the teleoconch.

**Etymology**

*lofficiali*, after Franck Lofficial, captain of R/V *Antéa* during the BIOMAGLO research cruise, for making the expedition a success.

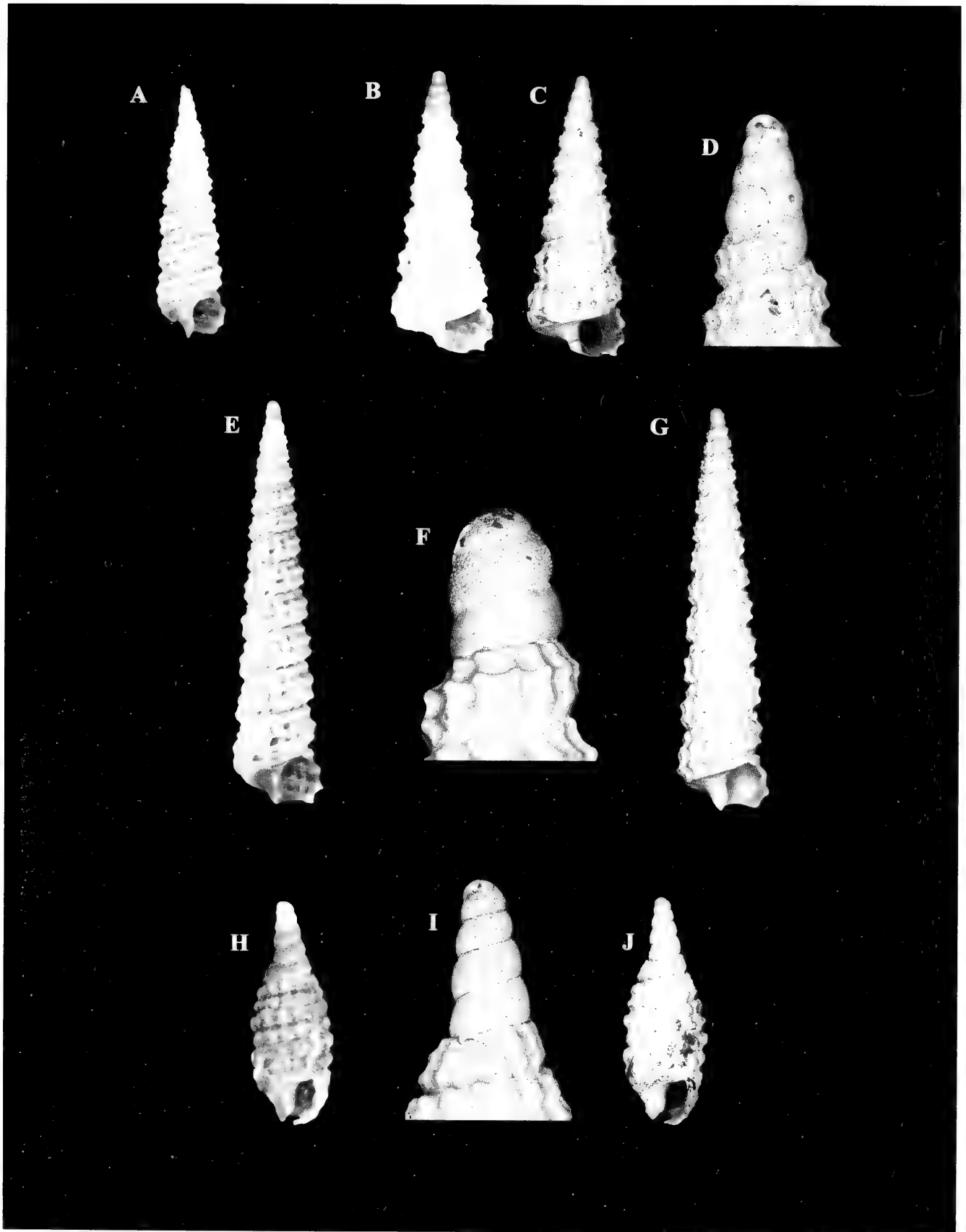
*Horologica* cfr. *macrocephala* Laseron, 1956  
(Fig. 4. A-C)

**Figured specimen**

A-C - (MNHN-IM-2012-25509) 1.70 x 0.62 mm, protoconch 0.55 x 0.27 mm, stn DW4813.

**Type locality**

Australia, Darwin, N. T.



**Fig. 3. [Comoro Is.].** **A.** *Clathropsis castellinae* Cecalupo & Perugia, 2014 (MNHN-IM-2012-25508), 3,35 x 0,95 mm, protoconch 0,62 x 0,25 mm, Glorieuses Is., stn DW4800, **B-D.** *Clathropsis marinesqueae* n. sp., holotype (MNHN-IM-2000-36009), 3,05 x 1,10 mm, protoconch 0,50 x 0,27 mm, Glorieuses Is., stn CP4798; **E-G.** *Clathropsis kolasinskiae* n. sp., holotype (MNHN-IM-2000-36010), 7,60 x 1,70 mm, protoconch 0,52 x 0,32 mm, SE Mohell, stn DW4836, **H-J.** *Horologica lofficiali* n. sp. holotype (MNHN-IM-2000-36011), 1,70 x 0,57 mm, protoconch 0,55 x 0,21 mm, SE Mohell, stn DW4864

**Fig. 3. [Comoro Is.].** **A.** *Clathropsis castellinae* Cecalupo & Perugia, 2014 (MNHN-IM-2012-25508), 3,35 x 0,95 mm, protoconca 0,62 x 0,25 mm, Glorieuses Is., stn DW4800, **B-D.** *Clathropsis marinesqueae* n. sp., olotipo (MNHN-IM-2000-36009), 3,05 x 1,10 mm, protoconca 0,50 x 0,27 mm, Glorieuses Is., stn CP4798, **E-G.** *Clathropsis kolasinskiae* n. sp., olotipo (MNHN-IM-2000-36010), 7,60 x 1,70 mm, protoconca 0,52 x 0,32 mm, a sud est d. Mohell, stn DW4836, **H-J.** *Horologica lofficiali* n. sp. olotipo (MNHN-IM-2000-36011), 1,70 x 0,57 mm, protoconca 0,55 x 0,21 mm, a sud est d. Mohell, stn DW4864

## Material examined

stn DW4800, Glorieuses Is., spm 1, 240-255 m, Expedition BIOMAGLO.

## Remarks

Second report from SW Indian Ocean.

*Clathropsis marinesqueae* n. sp.  
(Fig. 3. B-D)

## Type material

holotype (MNHN-IM-2000-36009) 3.05 x 1.10 mm, protoconch 0.50 x 0.27 mm, stn CP4798.

## Type locality

Comoro Is., Glorieuses Is., 80-147 m.

## Distribution

Known only from type locality.

## Material examined

stn CP4798, Glorieuses Is., spm 1, 80-147 m, Expedition BIOMAGLO.

## Description of holotype

Shell small, juvenile, conical regularly increasing, wide base with ratio W/H 0.36, very impressed sutures. Colour whitish opaque, protoconch and columella pale orange. Protoconch conical of 4.5 smooth convex whorls; see under SEM the embryonic whorls show a narrow granulous soprasutural band, the sutures are marked by minute grains. Teleoconch of about 7 convex whorls with reticulate sculpture of 3 spiral cords (1<sup>st</sup> cord much less prominent on the edge of the suture) crossed by axial ribs, 16 on last whorl, spiral and axial cords of same size; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip. Columella short, acuminate, smooth; outer lip slightly damaged, bordered by sculpture of the teleoconch.

## Comparison

*Clathropsis marinesqueae* n. sp. is compared with *Clathropsis lifouensis* Cecalupo & Perugia, 2017 from New Caledonia and Japan similar in colour and protoconch but narrower conical with ratio W/H 0.28; *Clathropsis laurenti* Cecalupo & Perugia, 2017 also it from New Caledonia has similar conicity but differs in colour and protoconch.

## Etymology

*marinesqueae*, after Sophie Marinesque, Deputy Director of, and Head of the marine sector in, the French admin-

istration of the Austral and Antarctic Territories (TAAF), for her support to the BIOMAGLO expedition.

*Clathropsis kolasinskiae* n. sp.  
(Fig. 3. E-G)

## Type material

holotype - (MNHN-IM-2000-36010) 7.60 x 1.70 mm, protoconch 0.52 x 0.32 mm, stn DW4836.

## Type locality

Comoro Is., SE Mohell, 82-88 m.

## Distribution

Known only from type locality.

## Material examined

stn DW4836, SE Mohell, spm 1, 82-88 m.

## Description of holotype

Shell large, narrowly conical, regularly increasing, impressed sutures. Colour sandy yellow, columella darker. Protoconch cylindrical, 3-3.5 transparent whorls; under SEM first two smooth, convex, granulous with sutures marked by minute grains. Teleoconch of about 12.5 convex whorls with reticulate sculpture of 3 spiral cords (1<sup>st</sup> cord less prominent) crossed by axial ribs, about 13 on last whorl, spiral and axial cords of same size; beads at each intersection. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by an angle. Columella short, acuminate, smooth; outer lip slightly damaged, bordered by sculpture of the teleoconch.

## Comparison

The only comparable species is *Clathropsis mellita* Lase-ron, 1956 from North Australia similar in shape and colour but with a clearly different protoconch.

## Etymology

*kolasinskiae*, after Joanna Kolasinski, coordinator of the European funds (FEDER) for the French administration of the Austral and Antarctic Territories (TAAF), which made the BIOMAGLO expedition possible.

*Clathropsis poppearum*  
Cecalupo & Perugia, 2012  
not figured

## Type locality

Philippines, Mactan Is., Olango Channel, 60-80 m.

cular aperture, outer lip thin indented by sculpture of teleoconch.

## Remarks

In bibliography we have not found species with similar protoconch.

## Etimology

*comoroensis*, from Comoro Is., distribution area.

***"Cerithiopsis" mayottensis* n. sp.**  
(Fig. 2. D-I)

## Type material

holotype - (MNHN-IM-2000-36007) 2.71 x 0.87 mm, protoconch 0.37 x 0.30 mm, stn DW4820.  
paratype 1 - (MNHN-IM-2000-36008) 2.50 x 0.90 mm, protoconch 0.37 x 0.30 mm, stn DW4820.

## Type locality

Comoro Is., South Mayotte, 295-336 m.

## Distribution

Known only from Comoro Is.

## Material examined

stn DW4820, South Mayotte, spms 2, 295-336 m, Expedition BIOMAGLO.

## Description of holotype

Shell small, perfectly conical, wide sutures, colourless, glassy. Protoconch cylindrical of 2.5 convex whorls; under SEM apex smooth, following whorls biconical, submedially strongly angulate and divided by a clear edge, with a sculpture of axial riblets limited to the upper part only. Teleoconch of 8 whorls with reticulate sculpture of 2 spiral cords (2<sup>nd</sup> more prominent) crossed by axial ribs, about 13 on last whorl with acute beads at each intersection. Under SEM the whole surface crossed by fine close-set axial threads. Other 2 cords at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by an angle. Columella short, acuminate, obliquely truncated, a slightly damaged sub-quadrate aperture, outer lip thin indented by sculpture of teleoconch.

## Remarks

In bibliography we have not found species to compare; we note that the protoconch has a certain similarity with that of the genus *Onchodia* Dall, 1924.

## Etymology

*mayottensis*, from Mayotte Is., type locality.

***"Cerithiopsis" sp.***  
(Fig. 2. J-L)

## Figured specimen

(MNHN-IM-2012-25507) 2.12 x 0.77 mm, protoconch 0.35 x 0.30 mm, stn DW4820.

## Distribution

Known only from Comoro Is.

## Material examined

stn DW4820, South Mayotte, spm 1, 295-336 m, Expedition BIOMAGLO.

## Description

Shell in bad condition, colour indefinable, small, perfectly conical, moderately impressed sutures. Slightly eroded protoconch cylindrical of 2.5 smooth whorls; under SEM apex small, following whorls biconical, medially strongly angulate, demarcated by start of a keel gradually better defined.

Teleoconch of 6 whorls with reticulate sculpture of 2 spiral cords (2<sup>nd</sup> more prominent) crossed by axial ribs, about 13 on last whorl, with acute beads at each intersection. Other 2 cords at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by an angle. Columella and aperture damaged.

## Comparison

*"Cerithiopsis" sp.*, is compared with *"Cerithiopsis" comoroensis* n. sp. having the same protoconch but differs in the sculpture of the teleoconch of 3 spiral cords.

***Clathropsis castelinae***  
Cecalupo & Perugia, 2014  
(Fig. 3. A)

## Material figured

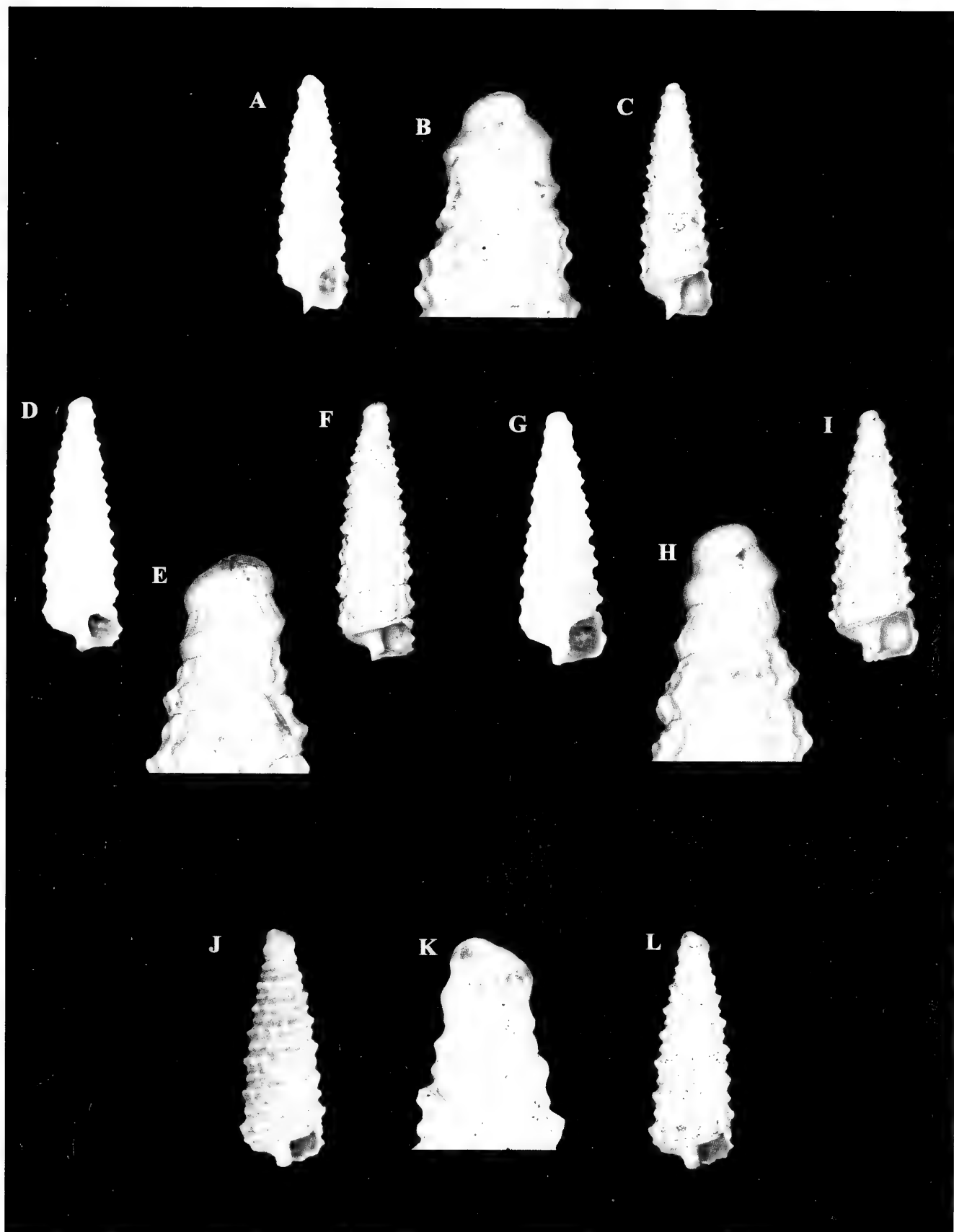
A - (MNHN-IM-2012-25508) 3.35 x 0.95 mm, protoconch 0.62 x 0.25 mm, stn DW4800.

## Type locality

South Madagascar, Galions Bay, 10 m.

## Distribution

Comoro Is., Mozambique, Madagascar.



**Fig. 2. [Comoro Is.]. A-C.** "*Cerithiopsis*" *comoroensis* n. sp. holotype (MNHN-IM-2000-36006), 2,76 x 0,85 mm, protoconch 0,37 x 0,32 mm, South Mayotte, stn DW4820; **D-F.** "*Cerithiopsis*" *mayottensis* n. sp. holotype (MNHN-IM-2000-36007), 2,71 x 0,87 mm, protoconch 0,37 x 0,30 mm, South Mayotte, stn DW4820; **G-I.** "*Cerithiopsis*" *mayottensis* n. sp., paratype 1 (MNHN-IM-2000-36008), 2,50 x 0,90 mm, protoconch 0,37 x 0,30 mm, South Mayotte, stn DW4820; **J-L.** "*Cerithiopsis*" sp., 2,12 x 0,77 mm (MNHN-IM-2012-25507), protoconch 0,35 x 0,30 mm, South Mayotte, stn DW4820

**Fig. 2. [Comoro Is.]. A-C.** "*Cerithiopsis*" *comoroensis* n. sp. olotipo (MNHN-IM-2000-36006), 2,76 x 0,85 mm, protoconca 0,37 x 0,32 mm, a sud di Mayotte, stn DW4820; **D-F.** "*Cerithiopsis*" *mayottensis* n. sp. olotipo (MNHN-IM-2000-36007), 2,71 x 0,87 mm, protoconca 0,37 x 0,30 mm, a sud di Mayotte, stn DW4820; **G-I.** "*Cerithiopsis*" *mayottensis* n. sp., paratipo 1 (MNHN-IM-2000-36008), 2,50 x 0,90 mm, protoconca 0,37 x 0,30 mm, a sud di Mayotte, stn DW4820; **J-L.** "*Cerithiopsis*" sp., 2,12 x 0,77 mm (MNHN-IM-2012-25507), protoconca 0,35 x 0,30 mm, a sud di Mayotte, stn DW4820

## Distribution

Known only from Comoro Is.

## Material examined

stn DW4820, South Mayotte, spm 1, 295-336 m, Expedition BIOMAGLO.

## Remarks

It is a fragment, 2.30 x 0.80 mm with a protoconch similar to the genus *Belonimorphis*.

## Note

Some deep-water species are reported from the Comoro Is. (stn DW4820, South Mayotte, 295-336 m) with particular morphological characters. The generic classification of the Cerithiopsidae family is complex both by giving priority to the teleoconch and the protoconch, without a greater knowledge of the soft parts at the moment it appears difficult to solve; preferring to avoid establishing new taxa based on a few specimens, we simply present these species by placing them temporarily under the genus "*Cerithiopsis*" pending further specimens.

**"*Cerithiopsis*" *antea* n. sp.**  
(Fig. 1. G-J)

## Type material

holotype - (MNHN-IM-2000-36004) 2.40 x 0.87 mm, protoconch 0.41 x 0.36 mm, stn DW4820.

paratype 1 - (MNHN-IM-2000-36005) 3.43 x 1.05 mm, protoconch 0.42 x 0.38 mm, stn DW4820.

## Type locality

Comoro Is., South Mayotte, 295-336 m (MNHN-IM-2000-36004).

## Distribution

Known only from Comoro Is.

## Material examined

stn DW4820, South Mayotte, spms 2, 295-336 m, Expedition BIOMAGLO.

## Description of holotype

Shell small, conical, impressed sutures, colour yellowish. Protoconch conical of 2.5 smooth whorls; under SEM embryonic whorl small, following whorls biconical, submedially strongly angulate, demarcated by start of a keel gradually better defined. Teleoconch of 5 whorls with reticulate sculpture of 3 spiral cords (1<sup>st</sup>

and 2<sup>nd</sup> closer) crossed by axial ribs, about 14 on last whorl, beads at each intersection. A fourth beaded cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by a weak thread. Columella short, acuminate, obliquely truncated, columellar callus bordering a circular aperture, siphonal canal and anal sulcus defined.

## Remarks

Given the shape it could be a *Joculator* but its particular protoconch is rather similar to "*Cerithiopsis*" *comoroensis* n. sp. from which it differs being markedly conical with submedian keel, not cylindrical with central keel as in "*Cerithiopsis*" *comoroensis*, the teleoconch is completely different.

## Etymology

*antea*, after IRD's research vessel *Antea*, that was used for the BIOMAGLO expedition; used as a noun in opposition.

**"*Cerithiopsis*" *comoroensis* n. sp.**  
(Fig. 2. A-C)

## Type material

holotype - (MNHN-IM-2000-36006) 2.76 x 0.85 mm, protoconch 0.37 x 0.32 mm, stn DW4820.

## Type locality

Comoro Is., South Mayotte, 295-336 m.

## Distribution

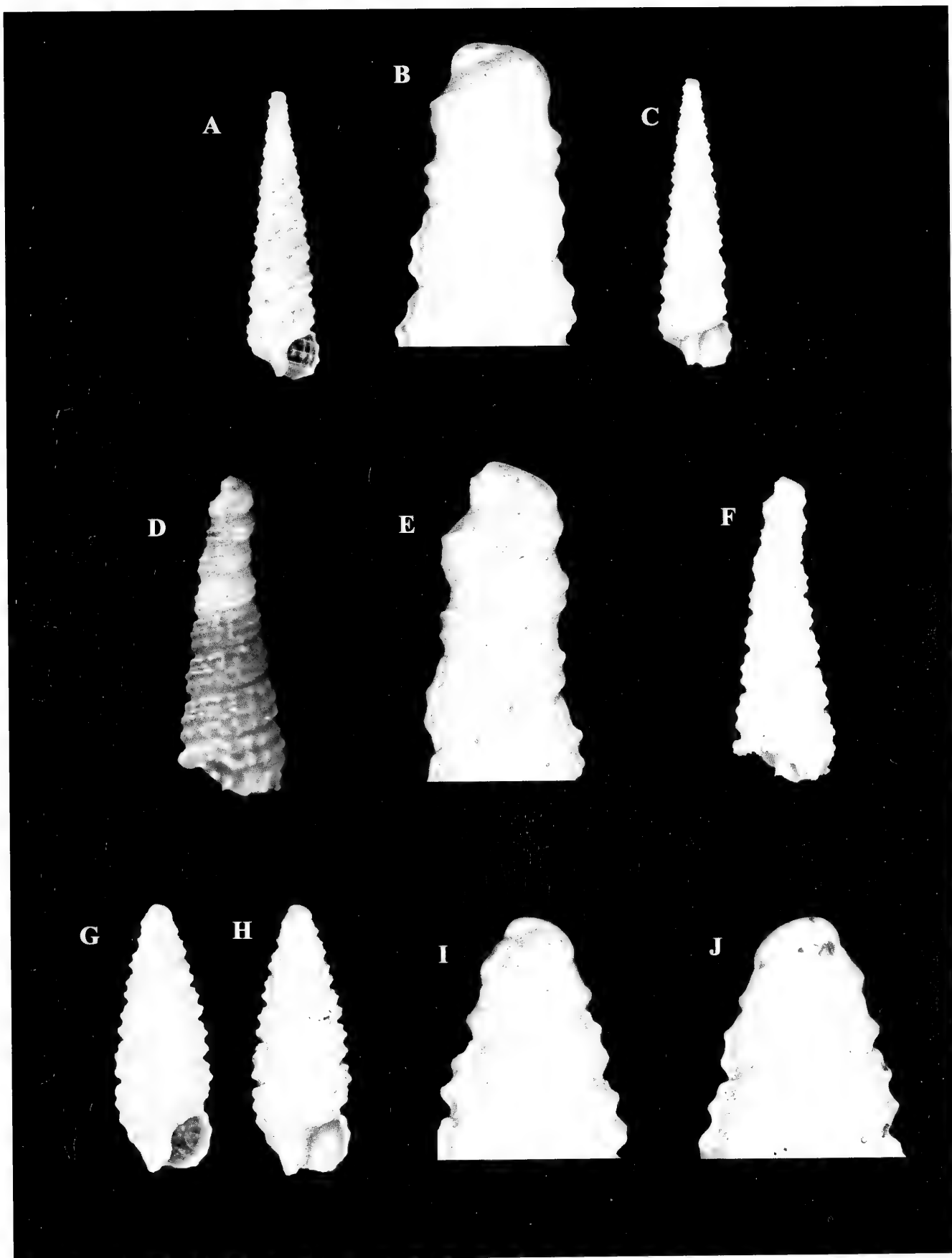
Known only from Comoro Is.

## Material examined

stn DW4820, South Mayotte, spm 1, 295-336 m, Expedition BIOMAGLO.

## Description of holotype

Shell small, perfectly conical, wide sutures, colourless, glassy. Protoconch cylindrical of 2.5 smooth whorls; under SEM apex small, following whorls biconical, medially strongly angulate, demarcated by start of a keel gradually better defined. Teleoconch of 6.5 whorls with reticulate sculpture of 3 spiral cords (1<sup>st</sup> spiral obsolete in first whorls appears progressively more evident and beaded) crossed by axial ribs, about 12 on last whorl, with acute beads at each intersection. Under SEM the whole surface crossed by fine close-set axial threads. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by an angle. Columella short, acuminate, obliquely truncated, columellar callus bordering a cir-



**Fig. 1. [Comoro Is.]. A-C.** *Belonimorphus jayi* n. sp., holotype (MNHN-IM-2000-36001), 5,10 x 1,33 mm, protoconch 0,50 x 0,35 mm, South Mayotte, stn. DW4820; **D-F.** *Belonimorphus* sp. (MNHN-IM-2012-25506), protoconch 0,70 x 0,37 mm, South Mayotte, stn DW4820. **G-I,** "*Cerithiopsis*" *antea* n. sp. holotype (MNHN-IM-2000-36004), 2,40 x 0,87 mm, protoconch 0,41 x 0,36 mm, South Mayotte, stn DW4820. **J.** "*Cerithiopsis*" *antea* paratype 1 (MNHN-IM-2000-36005), protoconch 0,42 x 0,38 mm South Mayotte, stn DW4820.

**Fig. 1. [Comoro Is.]. A-C.** *Belonimorphus jayi* n. sp., olotipo (MNHN-IM-2000-36001), 5,10 x 1,33 mm, protoconca 0,50 x 0,35 mm, a sud di Mayotte, stn DW4820; **D-F.** *Belonimorphus* sp. (MNHN-IM-2012-25506), protoconca 0,70 x 0,37 mm, a sud di Mayotte, stn DW4820. **G-I,** "*Cerithiopsis*" *antea* n. sp. olotipo (MNHN-IM-2000-36004), 2,40 x 0,87 mm, protoconca 0,41 x 0,36 mm, a sud di Mayotte, stn DW4820. **J.** "*Cerithiopsis*" *antea* paratipo 1 (MNHN-IM-2000-36005), protoconca 0,42 x 0,38 mm a sud di Mayotte, stn DW4820



<i>Marshallopsis sossoi</i>											x		x			
<i>Mendax samadiae</i>													x	x		
<i>Mendax</i> sp.										x	x		x	x		
<i>Retilaskeya philippinensis</i>	x		x		x		x	x		x	x		x	x	x	x
TUAMOTU																
<i>Marshallopsis melanesiana</i>	x															
<i>Marshallopsis utriculus</i>	x															x
VANUATU																
<i>Clathropsis luteocincta</i>								x							x	x
<i>Clathropsis serenamirrii</i>																x

Table. 2

Systematics

Clade **Hipsogastropoda** Ponder & Lindberg, 1997  
Informal Group **Ptenoglossa** Gray, 1853  
Superfamily **Triphoroidea** Gray, 1847  
Family **Cerithiopsidae** H. Adams & A. Adams, 1853

INDIAN OCEAN MATERIAL: COMORO Is.

*Belonimorphis jayi* n. sp.  
(Fig. 1, A-C)

Type material

holotype - (MNHN-IM-2000-36001) 5.10 x 1.33 mm, protoconch 0.50 x 0.35 mm, stn DW4820.  
paratype 1 - (MNHN-IM-2000-36002) 4.80 x 0.90 mm, protoconch 0.49 x 0.33 mm, stn DW4820.  
paratype 2 - (MNHN-IM-2000-36003) 2.76 x 0.92 mm, protoconch 0.48 x 0.30 mm, stn DW4820.

Type locality

Comoro Is., South Mayotte, 295-336 m.

Distribution

Known only from Comoro Is.

Material examined

stn DW4820, South Mayotte, spms 5, 295-336 m, Expedition BIOMAGLO.

Description of holotype

Shell medium in size, perfectly conical, wide sutures; colour whitish, semitransparent with interspaces between beads and columella pale yellowish. Protoconch cylindrical, blunt-tipped of 3 smooth convex whorls;

under SEM embryonic whorl smooth, following whorls with 2 central well defined keel. Teleoconch of 10 convex whorls with reticulate sculpture of 3 spiral cords (1<sup>st</sup> less prominent) crossed by axial ribs, about 15 on last whorl with beads at each intersection. Under SEM the whole surface crossed by fine close-set axial threads. A fourth cord at the base of last whorl emerging from insertion of outer lip; limit between columella and base highlighted by an angle and a very thin thread. Columella short, acuminate, obliquely truncated, columellar callus bordering a circular aperture, outer lip indented by the sculpture of the protoconch.

Remarks

The known species of the genus *Belonimorphis* Jay & Drivas, 2002 have a tapered protoconch with sculpture of 2 keels differing mainly in the shape of the teleoconch from cylindrical, in *B. ballardi* and *Belonimorphis* sp. (pl. 40, figs. E-H) both Cecalupo & Perugia, 2013 from Vanuatu, to conical with slightly constricted base, in *B. cubensis* and *B. rauli*, both (Rolan & Espinosa, 1992) from Carribean, *B. belonimorphis* Jay & Drivas, 2002 from La Reunion and *B. touhoensis* Cecalupo & Perugia, 2017 from New Caledonia. *Belonimorphis jayi* n. sp. has a regularly conical shape not tapering to the apex.

Etymology

*jayi*, after Maurice Jay (1925-2008), longtime resident of Réunion, co-author with Jean Drivas of Coquillages de la Réunion et de l'Île Maurice (Delachaux & Niestlé, 1987), and The Cerithiopsidae (Gastropoda) of Réunion Island (Indian Ocean) (Novapex, 3: 1-45).

*Belonimorphis* sp.  
(Fig. 1. D-F)

Figured specimen

**Fig. 1. D-F.** (MNHN-IM-2012-25506) protoconch 0.70 x 0.37 mm, stn DW4820.

<i>Horologica</i> cfr. <i>siazei</i>	x		x		x			x							
<i>Joculator lividus</i>	x	x	x		x			x		x	x				x
<i>Joculator saguili</i>	x		x			x		x							x
<i>Marshallopsis boucheti</i>	x							x		x	x	x			x
<i>Marshallopsis elvirarivae</i>	x														
<i>Marshallopsis frantagliaferroi</i>	x														
<i>Marshallopsis giotagliaferroi</i>	x														
<i>Marshallopsis melanesiana</i>	x														x
<i>Oparopsis floresi</i>	x														
<i>Prolixodens giampii</i>	x														
<i>Synthopsis vavaiensis</i>	x														
<b>FIJI</b>															
<i>Marshallopsis boucheti</i>	x							x		x	x				x
<i>Synthopsis maioi</i>	x														
<i>Synthopsis noninii</i>	x		x		x		x	x		x	x			x	x
<b>MARQUESAS Is.</b>															
<i>Synthopsis uahucaensis</i>	x														
<b>NEW CALEDONIA</b>								x							
<i>Clathropsis pallens</i>								x		x					x
<i>Horologica pusaterii</i>								x							
<i>Joculator savellii</i>								x							
<i>Joculator sbranai</i>								x							
<i>Mendax barbarae</i>								x							
<i>Potenatomus woodinensis</i>								x							
<i>Prolixodens alba</i>								x			x				
<i>Retilaskeya albanoi</i>								x							
<i>Seila elegantissima</i>								x							
<i>Seila maxima</i>								x	x					x	
<i>Specula jemeauensis</i>								x							
<i>Specula angelobaraggi</i>								x							
<i>Specula puillandrei</i>			x					x			x				x
<b>PAPUA NEW GUINEA</b>															
<i>Clathropsis annelaurae</i>											x				
<i>Clathropsis multispirae</i>	x	x	x					x		x	x			x	x
<i>Granulopsis thelcterium</i>			x							x	x			x	
<i>Horologica diffusa</i>	x	x						x		x	x	x			x
<i>Marshallopsis sossoi</i> n. sp.											x		x		
<i>Prolixodens alba</i>								x			x				
<i>Seila maxima</i>								x	x		x			x	
<b>PHILIPPINES</b>															
<i>Joculator</i> cfr. <i>dupouxae</i>										x	x				
<i>Synthopsis bicincta</i>			x	x		x				x	x			x	x
<i>Tubercliopsis maxi</i>										x					
<b>SALOMON</b>															
<i>Horologica gregaria</i>	x	x	x							x	x	x	x	x	

<i>Synthopsis noninii</i>		x	x		x		x		x	x		x	x				x	x
<i>Synthopsis praeacuta</i>		x	x		x		x			x		x	x					x
<i>Tuberclipsis miranda</i>		x	x	x			x			x		x	x	x			x	x
<b>MOZAMBIQUE</b>																		
<i>Cerithiopsidella caterinae</i>									x								x	
<i>Clathropsis</i> cfr. <i>arcangelae</i>									x	x								
<i>Clathropsis bugeae</i>									x								x	
<i>Clathropsis charlesi</i>									x								x	
<i>Clathropsis multispirae</i>			x	x	x	x			x	x		x	x				x	x
<i>Horologica gwenaeliae</i>					x				x								x	x
<i>Horologica nodosa</i>			x	x			x	x	x	x		x	x					x
<i>Joculator mygaki</i>									x					x			x	
<b><i>Marshallopsis joserosadoi</i></b>									x									
<i>Synthopsis albachiarae</i>				x					x			x	x				x	
<i>Synthopsis noninii</i>		x	x		x		x		x	x		x	x				x	x
<i>Synthopsis praeacuta</i>			x		x		x		x	x		x	x					x
<i>Tuberclipsis miranda</i>			x	x			x		x	x		x	x	x			x	x
<b>South AFRICA</b>																		
<b><i>Marshallopsis gombessa</i></b>		x							x								x	
<i>Seila</i> cfr. <i>ampulla</i>	x											x			x	x		
<i>Seila silviae</i>				x	x		x			x		x	x				x	x
<i>Specula styliformis</i>	x									x		x			x	x		
<b>South MADAGASCAR</b>																		
<i>Horologica lavanonoensis</i>																		x
<i>Mendax metivieri</i>						x												x
<i>Seila maxima</i>										x	x							x
<b>Western AUSTRALIA</b>																		
<i>Clathropsis impedita</i>	x																	
<i>Clathropsis quinquepilia</i>	x																	
<i>Clathropsis</i> sp.	x																	
<b><i>Marshallopsis hughmorrisoni</i></b>	x																	
<i>Prolixodens infracolor</i>	x																	
<i>Seila slacksmithae</i>	x																	
<i>Seila</i> sp.	x																	

Table. 1

List of Indo-Pacific species

the new species are highlighted in **bold**

**FP**- French Polynesia; **IND**- Indonesia; **J**- Japan; **LR**- La

Reunion; **LY**- Loyalty Is.; **MS**- Mauritius; **MZ**- Mozambique; **NC**- New Caledonia; **NZ**- New Zealand; **PH**- Philippines; **PNG**- Papua New Guinea; **RS**- Red Sea; **S**- Salomon; **SA**- South Africa; **SM**- South Madagascar; **V**- Vanuatu.

<b>AUSTRAL Is.</b>	FP	IND	J	LR	LY	MS	MZ	NC	NZ	PH	PNG	RS	S	SA	SM	V
<b><i>Horologica diana</i></b>	x															
<i>Horologica gregaria</i>	x	x	x			x				x	x	x			x	
<i>Horologica jayi</i>	x	x	x		x	x		x		x	x	x			x	x

of subfamilies and is derived from Marshall (1979) for the genera, pending analysis of the soft parts.

Acronyms and abbreviations

auct.	auctores (lat.). authors
cfr.	near/resembling
et al.	et alii (lat.), and others
fig./figs	figure/figures
juv.	juvenile form
AMS	Australian Museum, Sydney
MNHN	Muséum National d'Histoire Naturelle, Paris, France
WAM	Western Australian Museum [Perth, Australia]
n. sp.	new species

SEM	Scanning Electron Microscope
spms	specimen (s)
stn	station
W/H	width/height

List of Indian Ocean species

The new species are highlighted in **bold**

AU- Australia; C- Comoro; FP- French Polynesia; IND- Indonesia; J- Japan; LR- La Reunion; LY- Loyalty Is.; MS- Mauritius; MZ- Mozambique; NC- New Caledonia; NZ- New Zealand; PH- Philippines; PNG- Papua New Guinea; RS- Red Sea; SL- Salomon; SA- South Africa; SM- South Madagascar; V- Vanuatu.

COMORO	AU	C	FP	IND	J	LR	LY	MS	MZ	NC	NZ	PH	PNG	RS	SL	SA	SM	V
<i>Belonimorphis jayi</i>		x																
<i>Belonimorphis</i> sp.		x																
<i>“Cerithiopsis” antea</i>		x																
<i>“Cerithiopsis” comoroensis</i>		x																
<i>“Cerithiopsis” mayottensis</i>		x																
<i>“Cerithiopsis”</i> s. p.		x																
<i>Clathropsis castelinae</i>		x															x	
<i>Clathropsis marinesqueae</i>		x																
<i>Clathropsis poppearum</i>		x	x	x			x			x		x	x					x
<i>Clathropsis kolasinskiae</i>		x																
<i>Horologica diffusa</i>		x	x	x						x		x	x	x				x
<i>Horologica jayi</i>		x	x	x			x	x		x		x	x	x			x	x
<i>Horologica lofficiali</i>		x																
<i>Horologica</i> cfr. <i>macrocephala</i>	x	x																
<i>Joculator brisseti</i>		x																
<i>Joculator grimaldae</i>		x																
<i>Joculator keszlerae</i>		x																
<i>Joculator koluae</i>		x																
<i>Joculator latrechei</i>		x																
<i>Joculator minutissimus</i>		x		x		x												x
<i>Joculator pierresamueli</i>		x																
<i>Joculator</i> cfr. <i>recisus</i>		x								x		x						x
<i>Joculator saguili</i>		x			x					x								x
<i>Jocularor zahariasi</i>		x																
<i>Joculator zucconi</i>		x																
<i>Marshallopsis blanda</i>		x	x									x	x	x				x
<i>Mendax metivieri</i>		x			x	x												
<i>Prolixodens leogattellii</i>		x																
<i>Prolixodens martinoi</i>		x																
<i>Prolixodens vannonzii</i>		x																
<i>Retilaskeya chenui</i>		x				x												
<i>Retilaskeya reunionensis</i>		x				x												
<i>Seila gloriosa</i>		x																
<i>Specula bogii</i>		x																
<i>Specula giustii</i>		x																

## Materials

**Comoro Is.:** Expedition BIOMAGLO 2017, Corbari et al. (2017). Examined 275 spms of which 173 unidentified, belonging to 13 genera: *Belonimorphis* (2), "*Cerithiopsis*" (4), *Clathropsis* (4), *Horologica* (4), *Joculator* (11), *Marshalllopsi* (2), *Mendax* (1), *Prolixodens* (3), *Retilaskeya* (2), *Seila* (1), *Specula* (2), *Synthopsis* (2), *Tubercliopsis* (1). Identified 39 species and instituted 21 new species.

**Mozambique:** Expedition INHACA 2011. Examined 172 spms of which 111 unidentified, belonging to 7 genera: *Cerithiopsidella* (1), *Clathropsis* (4), *Horologica* (2), *Joculator* (1), *Marshalllopsi* (1), *Synthopsis* (3), *Tubercliopsis* (1). Identified 13 species and described 1 new species.

**South Africa:** Expedition VEMA 1963 and L. Ballesta & G. Clément coll. 2013. Examined 6 species of which 2 unidentified, belonging to 3 genera: *Marshalllopsi* (1), *Seila* (2), *Specula* (1). Identified 4 species and described 1 new specie.

**South Madagascar:** Expedition ATIMO VATE 2010, Bouchet et al. (2010). Already illustrated in Cecalupo & Perugia, 2014). Examined 65 species of which 55 unidentified, belonging to 3 genera: *Horologica* (1), *Mendax* (1), *Seila* (1). Identified 3 species.

**Western Australia:** coll. Bouchet, Bryce, Morrison & Strong 2011. Examined 111 spms of which 62 unidentified, belonging to 4 genera: *Clathropsis* (3), *Marshalllopsi* (1), *Prolixodens* (1), *Seila* (2). Identified 7 species, and described 2 new species.

**Austral Is.:** Expedition BENTHAUS 2002, Richer de Forges (2002). Atelier RAPA 2002, Expedition TUHAA PAE 2013, Debitus C. (2013). Examined 270 species of which 161 unidentified, belonging to 6 genera: *Horologica* (4), *Joculator* (2), *Marshalllopsi* (5), *Oparopsis* (1), *Prolixodens* (1), *Synthopsis* (1). Identified 109 species and described 5 new species.

**Fiji:** Expedition SUVA 2 - 1998; Expedition MUSORSTOME 10, 1998. Examined 3 species of which 1 unidentified, belonging to 2 genera: *Marshalllopsi* (1), *Synthopsis* (2). Identified 3 species and described 1 new specie.

**Marquesas Is.:** Bryce & Kaiser coll., 1997, Expedition MUSORSTOM 9 - 1997. Examined 31 species of which 30 unidentified, belonging to 1 genus: *Synthopsis* (1); described 1 new specie.

**New Caledonia:** Expedition LAGON, 1984-1993, Expedition NORFOLK 2, 2003, Richer de Forges (2003), NORFOLK 2; Expedition EBISCO 2005, Richer de Forges (2005). Expedition KANACONO 2016, Puillandre N. & S. Samadi (2016); Expedition KANADEEP, 2017, Samadi & Hourdez (2017), Expedition BATHUS 2 - 1993, Richer de Forges (1993); examined 234 species of which 95 unidentified, belonging to 10 genera: *Clathropsis* (1), *Horologica* (1), *Joculator* (2), *Marshalllopsi* (2), *Mendax* (1), *Potenatomus* (1), *Prolixodens* (1), *Retilaskeya* (1), *Seila* (3), *Specula* (3). Identified 139 species and described 8 new species.

**Papua New Guinea:** Expedition KAVIENG 2014, Payri (2014); Expedition BIOPAPUA 2010, Samadi & Corbari, (2010). Examined 5 species of which 2 unidentified, belonging to 6 genera: *Clathropsis* (2), *Granulopsis* (1), *Horologica* (1), *Marshalllopsi* (1), *Prolixodens* (1), *Seila* (1). Identified 6 species and described 1 new specie.

*logica* (1), *Marshalllopsi* (1), *Prolixodens* (1), *Seila* (1). Identified 6 species and described 1 new specie.

**Philippines:** (Panglao Marine Biodiversity Project 2004). Examined 31 spms of which 28 unidentified, belonging to 3 genera: *Joculator* (1), *Synthopsis* (1), *Tubercliopsis* (1), identified 3 species.

**Salomon Sea:** Expedition SALOMON 1 - 2001, Richer de Forges (2001); Expedition SALOMON 2 - 2004, Richer de Forges (2004); Expedition MADEEP - 2014, Corbari et al. (2014). Examined 11 species of which 1 unidentified, belonging to 5 genera: *Horologica* (1), *Marshalllopsi* (1), *Mendax* (2), *Retilaskeya* (1), *Synthopsis* (1). Identified 6 species and described 2 new species.

**Society Is.:** Expedition TARASOC 2009, Bouchet (2009). Examined 2 species unidentified.

**Tarawa Seamounts:** Expedition TARASOC 2009. Examined 3 species unidentified.

**Tuamotu:** Expedition TUAM 2011, Debitus C. (2011). Examined 21 species of which 19 unidentified, belonging to 1 genus: *Marshalllopsi* (2). Identified 2 species.

**Vanuatu:** Santo Marine Biodiversity Survey 2006, Expedition MUSORSTOM 8 -1994. Examined 63 species of which 61 unidentified, belonging to 1 genus: *Clathropsis* (2). Identified 2 species and described 1 new specie.

Overall 1307 specimens were examined belonging to 120 species, 42 of which are new species here described (17 new species for Pacific Ocean, and 25 new species for Indian Ocean).

*Marshalllopsi gombessa* n. sp. has been reported from Comoro Is., Mozambique and South Africa; *Marshalllopsi sossoi* n. sp. has been reported from Papua New Guinea and Salomon Is.

## Methods

The purpose of this work is the identification of the new species present in the material examined and, being non-living micromolluscs, their identification is based only on the analysis of the morphological characteristics of the shell being the soft parts unknown.

The material was washed with fresh water, selected specimens in good condition were photographed with digital camera and with SEM. The size of the shells were measured manually with a microscope 20/40x (objective with millimeter scale).

In the generic classification we have always given priority to the peculiar feature of the protoconch. However, after the many species analyzed, we believe that an evaluation based only on the examination of the protoconch or teleoconch is an understatement leaving many doubts that can be clarified by the examination of the soft parts.

For some new deep-water species reported from Comoro Is. (stn DW4820, South Mayotte, 295-336 m) with particular morphological characters, we opted for the provisional inclusion in the genus "*Cerithiopsis*" waiting for more specimens to study.

The systematics follows Bouchet et al. (2017), to the level

# Report on some Cerithiopsidae (Mollusca: Gastropoda) from the Indo-Pacific province

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\*Alberto Cecalupo (✉) & #Ivan Perugia

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HARVARD UNIVERSITY

\* Research Associate c/o  
Acquario Civico e Stazione  
Idrobiologica di Milano,  
Viale Gadio 2, 20121  
Milano, Italy,  
acecalupo@gmail.com,  
(✉) corresponding author

# Via Roncalceci 152, loc.  
Filetto, 48125 Ravenna,  
Italy,  
ivanperugia@virgilio.it

## Abstract

The present paper illustrates specimens of the family Cerithiopsidae reported from the Indo-Pacific area by the MNHN during expeditions made between 1993 and 2017. In the Eastern Indian Ocean, the research areas are Comoro Is., Mozambique, South Madagascar, South Africa and Western Australian coasts. In Pacific Ocean are New Caledonia, French Polynesia (Austral Is., Fiji, Marquesas Is., Society Is., Tarawa, Vanuatu, Tuamotu), Philippines, Salomon Is. and Papua New Guinea. From the analysis of the material 120 species were identified, 42 of which new for science. Some deep-water species, reported from the Comoro Is., are of uncertain generic classification and have been provisionally included in the genus "*Cerithiopsis*", pending the study of further specimens.

## Key words

Triphoroidea, Cerithiopsidae, Comoro Is., South Madagascar, Mozambique, South Africa, West Australia, New Caledonia, Society Is., Archipelago Austral Is., Marquesas Is., Tuamotu, Tarawa Is., Vanuatu, Republic of Fiji, Papua New Guinea, Philippines, systematics, new species.

## Riassunto

Il presente contributo illustra specie della famiglia Cerithiopsidae H. Adams & A. Adams, 1853 provenienti dalla provincia indo-pacifica. Il materiale è stato riportato dal MNHN durante le spedizioni oceanografiche effettuate tra il 1993 e il 2017.

Le aree di ricerca geografiche sono state così suddivise. Per l'Oceano Indiano orientale: Is. Comore, Mozambico, Sud Africa, Sud Madagascar e coste dell'Australia occidentale; mentre per l'Oceano Pacifico, il materiale proviene da: Nuova Caledonia, Polinesia Francese che comprendono (Isole Australi, Is. Figi, Is. Marchesi, Is. della Società, Tarawa, Vanuatu, Tuamotu), Filippine, Isole Salomone e Papua Nuova Guinea. Dall'analisi del materiale esaminato sono state identificate 120 specie, 42 delle quali nuove per la scienza. Alcune specie di profondità citate per le Isole Comore sono di difficile determinazione generica e quindi provvisoriamente incluse nel genere "*Cerithiopsis*", in attesa dello studio di ulteriori esemplari per consentire la definizione di un nuovo genere.

## Parole chiave

Triphoroidea, Cerithiopsidae, Comoro Is., sud Madagascar, Mozambique, sud Africa, Australia orientale, Nuova Caledonia, Society Is., Archipelago Austral Is., Marquesas Is., Tuamotu, Tarawa Is., Vanuatu, Repubblica di Fiji, Papua Nuova Guinea, Filippine, sistematica, nuove specie.

## Introduction

This contribution is a sequel to our previous works on the identification of micromolluscs of the family Cerithiopsidae H. Adams & A. Adams, 1853, superfamily Triphoroidea Gray, 1847.

The first "provisional classification" presented by Marshall (1978) included three subfamilies (Aliptinae, Eumetulinae, Cerithiopsinae) and 32 genera; currently, according to WoRMS (October 2020), three subfamilies recognized Aliptinae, Cerithiopsinae, Seilinae while Eumetulinae is transferred to Newtoniellidae) and 39 genera.

In Cecalupo & Perugia (2012) the genera known at the time were listed and a key to their determination was presented, illustrating their protoconches; a later "Tentative key to the genera of Indo-Pacific" with images for each genus of distinctive characters was illustrated in Cecalupo & Perugia (2013). Our previous works con-

cerning the Cerithiopsidae family have mainly covered, in chronological order, the following geographical areas: Philippines, Vanuatu, French Polynesia, South Madagascar, New Caledonia, Papua New Guinea, Indonesia and Okinawa with the establishment of about 500 new species; see Cecalupo & Perugia (2012; 2013; 2014<sub>a</sub>; 2014<sub>b</sub>; 2016; 2017<sub>a</sub>; 2017<sub>b</sub>; 2018; 2019<sub>a</sub>; 2019<sub>b</sub>; 2019<sub>3</sub>; 2020). In the present paper the materials reported by the Museum National D'Histoire Naturelle (MNHN) of Paris (France), during a series of scientific expeditions between 1993 and 2017 in the Indo-Pacific area examined. The many islands in this province are renowned for the variety of flora, fauna terrestrial and marine and the high level of endemics.

This new material expands the knowledge of this family by examining 1307 specimens with 120 species identified, 42 new species instituted (17 new species for Pacific Ocean, and 25 new species for Indian Ocean).

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*Example of systematic hierarchy and synonymy:*

Family Cardiidae Lamarck, 1809

Subfamily Cardinae Lamarck, 1809

Genus *Acanthocardia* Gray, 1853

(type species *Cardium aculeatum* Linné, 1758)

*Cardium indicum* Lamarck, 1819

(Fig. 1. A-D, Fig. 2. C)

*Cardium hians* Brocchi, 1814: p. 50, pl. 13, fig. 6 (non Spengler, 1799).

*Cardium indicum* Lamarck, 1819: p. 4.

*Cardium (Cardium) indicum* Lamarck – Fischer-Piette, 1977: p. 112, pl. 10, fig. 4 (type).

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... reported by Richardson & Smith (1965)

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SALAS C., 1996. Marine Bivalves from off the Southern Iberian Peninsula collected by the Balgim and Fauna 1 expeditions. *Haliotis*, **25**: 33-100.

GRILL B. & ZUSCHIN M., 2001. Modern shallow- to deep-water bivalve death assemblages in the Red Sea – ecology and biogeography. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **168**: 75-96.

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CARTER J.G., CAMPBELL D.C. & CAMPBELL M.R. 2000. Cladistic perspectives on early bivalve evolution, in Harper E.M., Taylor J.D. & Crame J.A. (eds), *The Evolutionary Biology of the Bivalvia*. Geological Society, London, *Special Publications*, **177**: 47-95.

VOKES H.E., 1980. *Genera of the Bivalvia: a systematic and bibliographic catalogue (revised and update)*. Paleontological Research Institution, Ithaca, Edwards Brothers Inc., 307 pp.

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